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L8: Entry 47 of 57

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TITLE: Identification and tracking of persons using RFID-tagged items in store environments

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US 20020165758 A1

November 7, 2002

Abstract Text (1):

A method and system for identifying and tracking persons using RFID-tagged items carried on the persons. Previous purchase records for each person who shops at a retail store are collected by POS terminals and stored in a transaction database. When a person carrying or wearing items having RFID tags enters the store or other designated area, a RFID tag scanner located therein scans the RFID tags on that person and reads the RFID tag information. The RFID tag information collected from the person is correlated with transaction records stored in the transaction database according to known correlation algorithms. Based on the results of the correlation, the exact identity of the person or certain characteristics about the person can be determined. This information is used to monitor the movement of the person through the store or other areas.

Brief Summary Text (5):

Manufacturers, distributors and/or retailers have a need to track their products. Conventionally, a manufacturer, a distributor or a retailer attaches a Radio Frequency Identification (RFID) tag on each product to identify and track their merchandise. By the transmission and reception of radio signals to and from the RFID tag on the product, the product can be tracked from the time of manufacture to the time of sale without any direct visual or physical contact with the product being monitored. RFID tag information typically stored in a RFID tag of a product includes (1) a retail SKU number (e.g., UPC--universal product code) identifying the name, manufacturer and/or suggested price of the product, (2) a unique serial number identifying the product, or (3) the SKU number and the unique serial number. In the past, the SKU numbers have been printed on products in the form of bar codes which can be read by a Point-of-Sale (POS) terminal having a bar code scanner. A typical use of the SKU number is to look up the product price at the time of purchase. Merchants also use the SKU numbers to keep track of inventory so that they know which products are selling well and when to reorder the products from wholesalers. The unique serial number stored in a RFID tag can be a globally unique number or a number assigned in series to products manufactured in the same product category.

Description Paragraph (8):

FIG. 1 is a block diagram of a person identification and tracking system 100 according to a first embodiment of the present invention. The system 100 will be explained for use in a retail store, but is equally applicable in other locations or geographical areas. As shown in FIG. 1, the system 100 includes a plurality of RFID tag scanners 20, a correlation module 10 including a person tracking unit 12, a transaction database 30, a data compiler 40, and a plurality of POS (Point-of-

Sale) terminals 50, all operatively coupled.

Description Paragraph (9):

The POS terminals 50 are located at places, such as the front area of a retail store, where individuals (e.g., customers) render payment for merchandise. When the persons make purchases at the store, the purchase records collected by the POS terminals 50 are received by the data compiler 40. The purchase records may include information on products that the person has purchased (e.g., SKU number, unique serial number, etc.) as well as the personal information of the purchaser, such as the name, address, customer number, etc. Generally, the product information will be obtained by scanning bar codes on the products, and the personal information will be obtained when the person uses his or her credit card, bank card, shopper card or the like to render payment for the purchasing products. In some embodiments, the purchased product information may be obtained by the POS terminals 50 by detecting radio signals from RFID tags on the purchased products at the point of sale.

Description Paragraph (11):

The RFID tag scanners 20 are located throughout the "roaming" areas of the store. A roaming area is defined herein as any area where a person can move around freely. Each of the RFID tag scanners 20 is capable of scanning a predetermined range area and reads radio signals transmitted from RFID tags present in that range. In a preferred embodiment, RFID tags 70 are integrated into items and such items are introduced to the system 100 by persons 60 who are wearing or carrying such items. Any item can include a RFID tag and may be a hat, watch, belt, shoes, scarf, purse, wallet, clothing, briefcase, jewelry, or any other item that can be "carried" on or by a person. The RFID tags 70 are conventional RFID tags that are extremely small and inconspicuous although FIG. 1 has been drawn to exaggerate the size and location of the RFID tags 70. Depending on the application, the RFID tag 70 may store therein a retail SKU number, a unique serial number identifying the item, or both.

Description Paragraph (21):

When a person 60 enters a retail store, a shopping mall, an airport, a train station, a train, or any location where a person can roam, a RFID tag scanner 20 located therein scans all identifiable RFID tags carried on the person 60 and obtains SKU numbers for the items carried on the person 60. This list or collection of items is then assigned to a particular tracking number or some identification number, so that this collection of items can be identified by that number. As the person 60 moves through the store or other roaming areas, different RFID tag scanners 20 located therein scan the RFID tags on the person 60, and each RFID tag scanner 20 transmits the detected RFID tag information to the person tracking unit 120. The person tracking unit 120 compares this information with different lists of items to identify the tracking number or the like associated with the person 60. In this manner, the movement of the person can be tracked. The person tracking unit 120 may keep records of different locations where the person 60 has visited as well as the visitation times to track the person 60.

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Nov 7, 2002

DOCUMENT-IDENTIFIER: US 20020165758 A1

TITLE: Identification and tracking of persons using RFID-tagged items

Abstract Paragraph:

A method and system for identifying and tracking persons using RFID-tagged items carried on the persons. Previous purchase records for each person who shops at a retail store are collected by POS terminals and stored in a transaction database. When a person carrying or wearing items having RFID tags enters the store or other designated area, a RFID tag scanner located therein scans the RFID tags on that person and reads the RFID tag information. The RFID tag information collected from the person is correlated with transaction records stored in the transaction database according to known correlation algorithms. Based on the results of the correlation, the exact identity of the person or certain characteristics about the person can be determined. This information is used to monitor the movement of the person through the store or other areas.

Summary of Invention Paragraph:

[0004] Manufacturers, distributors and/or retailers have a need to track their products. Conventionally, a manufacturer, a distributor or a retailer attaches a Radio Frequency Identification (RFID) tag on each product to identify and track their merchandise. By the transmission and reception of radio signals to and from the RFID tag on the product, the product can be tracked from the time of manufacture to the time of sale without any direct visual or physical contact with the product being monitored. RFID-tag information typically stored in a RFID tag of a product includes (1) a retail SKU number (e.g., UPC--universal-product code) identifying the name, manufacturer and/or suggested price of the product, (2) a unique serial number identifying the product, or (3) the SKU number and the unique serial number. In the past, the SKU numbers have been printed on products in the form of bar codes which can be read by a Point-of-Sale (POS) terminal having a bar code scanner. A typical use of the SKU number is to look up the product price at the time of purchase. Merchants also use the SKU numbers to keep track of inventory so that they know which products are selling well and when to reorder the products from wholesalers. The unique serial number stored in a RFID-tag can be a globally unique number or a number assigned in series to products manufactured in the same product category.

Detail Description Paragraph:

[0016] FIG. 1 is a block diagram of a person identification and tracking system 100 according to a first embodiment of the present invention. The system 100 will be explained for use in a retail store, but is equally applicable in other locations or geographical areas. As shown in FIG. 1, the system 100 includes a plurality of RFID tag scanners 20, a correlation module 10 including a person tracking unit 12, a transaction database 30, a data-compiler 40, and a plurality of POS (Point-of-Sale) terminals 50, all operatively-coupled.

Detail Description Paragraph:

[0017] The POS terminals 50 are located at places, such as the front area of a retail store, where individuals (e.g., customers) render payment for merchandise. When the persons make purchases at the store, the purchase records collected by the

POS terminals 50 are received by the data compiler 40. The purchase records may include information on products that the person has purchased (e.g., SKU number, unique serial number, etc.) as well as the personal information of the purchaser, such as the name, address, customer number, etc. Generally, the product information will be obtained by scanning bar codes on the products, and the personal information will be obtained when the person uses his or her credit card, bank card, shopper card or the like to render payment for the purchasing products. In some embodiments, the purchased product information may be obtained by the POS terminals 50 by detecting radio signals from RFID tags on the purchased products at the point of sale.

Detail Description Paragraph:

[0019] The RFID tag scanners 20 are located throughout the "roaming" areas of the store. A roaming area is defined herein as any area where a person can move around freely. Each of the RFID tag scanners 20 is capable of scanning a predetermined range area and reads radio signals transmitted from RFID tags present in that range. In a preferred embodiment, RFID tags 70 are integrated into items and such items are introduced to the system 100 by persons 60 who are wearing or carrying such items. Any item can include a RFID tag and may be a hat, watch, belt, shoes, scarf, purse, wallet, clothing, briefcase, jewelry, or any other item that can be "carried" on or by a person. The RFID tags 70 are conventional RFID tags that are extremely small and inconspicuous although FIG. 1 has been drawn to exaggerate the size and location of the RFID tags 70. Depending on the application, the RFID tag 70 may store therein a retail SKU number, a unique serial number identifying the item, or both.

Detail Description Paragraph:

[0029] When a person 60 enters a retail store, a shopping mall, an airport, a train station, a train, or any location where a person can roam, a RFID tag scanner 20 located therein scans all identifiable RFID tags carried on the person 60 and obtains SKU numbers for the items carried on the person 60. This list or collection of items is then assigned to a particular tracking number or some identification number, so that this collection of items can be identified by that number. As the person 60 moves through the store or other roaming areas, different RFID tag scanners 20 located therein scan the RFID tags on the person 60, and each RFID tag scanner 20 transmits the detected RFID tag information to the person tracking unit 120. The person tracking unit 120 compares this information with different lists of items to identify the tracking number or the like associated with the person 60. In this manner, the movement of the person can be tracked. The person tracking unit 120 may keep records of different locations where the person 60 has visited as well as the visitation times to track the person 60.

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File: PGPB

Nov 20, 2003

DOCUMENT-IDENTIFIER: US 20030216969 A1

TITLE: Inventory management system

Abstract Paragraph:

Methods, systems, and articles of manufacture consistent with certain aspects related to the present invention collect item information from RFID tags attached to items in an inventory, and uses the collected item information to perform various inventory management processes. In one aspect, the inventory management processes may include determining, reporting, and/or providing corrective actions for one or more events associated with at least one of depletions of items in the inventory, changes in the design of items in the inventory, defects with one or more items, misplaced items, the movement of an unusual number of items within a short period of time (i.e., shrinkage), and malfunctions of one or more components included in the environment.

Cross Reference to Related Applications Paragraph:

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/350,023, filed Jan. 23, 2002, the disclosure of which is expressly incorporated herein by reference in its entirety. Further, this application is a continuation-in-part of U.S. patent application Ser. No. _____, filed Jan. 9, 2003, for "Intelligent Station Using Multiple RF Antennae and Inventory Control System and Method Incorporating Same" (Attorney Docket no. 089137/0110) the disclosure of which is also incorporated herein by reference in its entirety.

Summary of Invention Paragraph:

[0002] This invention relates to inventory management systems and, more particularly, to methods and systems for performing an inventory management process that uses an intelligent station to track and/or inventory items that are tagged with Radio Frequency Identification (RFID) tags.

Summary of Invention Paragraph:

[0003] Inventory management is becoming increasingly important in today's growing economy. New products are continuously being developed and placed in the market for consumer purchase. Although this growth provides consumers with more choices for selecting various goods and services, businesses (e.g., retailers, wholesalers, etc.) are tasked with managing this growing inventory.

Summary of Invention Paragraph:

[0004] To manage growing product inventories, businesses have implemented perpetual type inventory management systems, which are systems that use Point Of Sale (POS) data on products sold, invoicing data, and historical data on inventory audits or cycle counts (e.g., periodic inventory counts of products) to determine the inventory that exists within the walls of a retail store. POS data generally refers to data generated at a checkout system (i.e., cash register). Based on the inventory level within the retail stores, products may be reordered from a manufacturer. Alternatively, the manufacturer and retailer may have an agreement that directs the manufacturer to preemptively deliver products according to the terms of the agreement. Ideally, inventory is replenished in a manner such that inventory arrives at the retail store just before existing stock levels are

exhausted.

Summary of Invention Paragraph:

[0005] Although perpetual inventory management systems alleviate some of the burden in managing large inventories, they employ a management that injects inaccuracies in cycle counts, POS scanning data, redundant re-ordering, misdirected shipments, and/or unusual sales velocity (i.e., the sale of products that take place either too fast or too slow). The result is physical (actual) inventory out-of-stock levels as high as 11-12 percent or even much higher for specially promoted products or products that are closely monitored for safety purposes (e.g., products with expiration dates).

Summary of Invention Paragraph:

[0006] Another shortcoming associated with perpetual inventory management systems includes inventory shrinkage, also described as the reduction of inventory due to non-sale circumstances. For example, shrinkage may occur at any point in a supply chain, stemming from invoice errors, vendor fraud, misdirected shipments, retail employee theft and customer theft. If inventory is computed as described above (i.e., using perpetual inventory management techniques), shrinkage rates (amounting to several percent of sales) can cause divergence of theoretical (i.e., inventory that is proposed or planned) and physical inventory. Another problem with perpetual inventory management systems is the uncertainty associated with the effectiveness of product promotions. For instance, if the relationship between price and inventory velocity, known as price elasticity, is not well understood, promotions can cause an out-of-stock condition that negatively impacts customer satisfaction and loyalty. Alternatively, promotions can fail to achieve a desired reduction of inventory when too much inventory is ordered and the price elasticity is poorly estimated or measured.

Summary of Invention Paragraph:

[0007] Further, another related problem with conventional inventory management systems is associated with misplaced inventory on a retail shelf or similar support unit. Product manufacturers devote large sums of money to market certain products to consumers. In some instances, this marketing may include combating a competitor that manufactures a similar product. Because retailers generally desire to present as much inventory as possible for sale to the customer, some employees may fill a void on a shelf dedicated for an out of stock product with related products. In some instances, the related products may include products produced by a manufacturer's competitor. This may result in lost sales for the manufacturer and, in some cases, reduction in customer satisfaction. This may also violate agreements between retailers and manufacturers or their distributors.

Summary of Invention Paragraph:

[0008] To address the shortcomings of conventional inventory management systems, businesses have begun to incorporate wireless identification devices to assist in managing the inventory of products. This advancement contemplates attaching Radio Frequency Identification (RFID) tags on products during manufacture or when the products are stored in a warehouse. Each RFID tag includes an Integrated Circuit (IC) that enables the tag to have a unique identification number. Therefore, when a product is taken from a warehouse and placed on a retail shelf, for example, the products may be scanned to give a comprehensive inventory. Further, RFID tag technologies have been contemplated in providing distributed inventory management between a manufacturer and a retailer. For example, a manufacturer may be alerted through the Internet each time a product is sold at a retailer using the information stored in the product's RFID tag. The manufacturer may then use this information to forecast replenishment schedules with the retailer to prevent an out of stock situation.

Summary of Invention Paragraph:

[0009] Although the above mentioned RFID tag developments help overcome some of the

shortcomings of conventional perpetual inventory management systems, these developments lack the capabilities to provide real, or near real, time comprehensive inventory management in almost any point of a supply chain. Accordingly, there is a need to provide an intelligent inventory management system to provide a comprehensive view of the inventory within a particular environment.

Summary of Invention Paragraph:

[0010] Methods, systems, and articles of manufacture consistent with certain aspects related to the present invention provide a process for managing an inventory of items, each item being positioned in a respective location within an environment and being associated with a corresponding wireless identification device. In one aspect of the invention, the process may include providing item information associated with each item to each corresponding wireless identification device. Based on the item information, the process may perform an inventory management process to provide real time information associated with the inventory of items. The inventory management process may include at least one of an out of stock control process, a shrinkage recognition process, a rapid product recall process, an alert monitor process, and a sales optimization process. Each of these processes may perform various tasks that are used to manage the inventory of items in the environment, such as monitoring inventory levels of the items, detecting misplaced items in the environment, and providing feedback information associated with the items based on detected events (e.g., suggested alternative locations for certain items based on sales data).

Brief Description of Drawings Paragraph:

[0017] FIG. 5 is a flowchart of an exemplary inventory analysis process consistent with certain aspects related to the present invention;

Detail Description Paragraph:

[0022] Systems and methods consistent with certain aspects related to the present invention enable an intelligent inventory management process to monitor and collect information associated with an inventory of items (e.g., products) included in an environment. An item, as the term is used herein, may be any type of product that is manufactured, developed, grown by a farm business, and provided by a manufacturer, business entity, individual, group of individuals, etc. For example, an item may be food (e.g., produce, dairy products, canned goods, etc.), an article of clothing, a plant or similar type of horticultural product, a machined part for an engine, sporting goods, etc. Further, an item may be associated with live animals or fish, such as livestock (e.g., cattle) that are raised by a livestock provider and sold to a livestock processing business. Alternatively, an item may be a domesticated or non-domesticated animal, such as a dog or reptile that is raised and/or maintained by an animal provider or caretaker (e.g., pet store, zoo, etc.).

Detail Description Paragraph:

[0023] The collected information may be used to perform various inventory management processes that enable a user to control the inventory of items, monitor shrinkage, facilitate and identify recalled or defective items included in the inventory, manage the misplacement of items within the environment, and receive alert messages associated with a variety of items inventory conditions, such as security conditions, out of stock conditions, etc.

Detail Description Paragraph:

[0024] In one aspect of the invention, an environment (e.g., retail store, etc.) uses a system of RFID-enabled structures, such as shelf units, to keep track of an inventory of items. Such a system is described in U.S. patent application Ser. No. _____, filed Jan. 9, 2003 (Attorney Docket No. 089137/0110), which is hereby incorporated by reference in its entirety. Methods and systems consistent with certain aspects related to the present invention enable data associated with the items to be repeatedly collected by a data collection system. A user may operate a user interface that provides demand-based item information (i.e., when the user

requests it) or exception-based item information (i.e., when something unusual or noteworthy occurs). Based on the collected data, an intelligent inventory management application and/or the user may manage out of stock items, monitor shrinkage, perform rapid recall functions, and send out alerts about noteworthy events.

Detail Description Paragraph:

[0026] FIG. 1 is a high level block diagram of an exemplary inventory management system 100 consistent with certain aspects related to the present invention. As shown, system 100 may include one or more environments 110-1 to 110-N interconnected by a network 180. Environments 110-1 to 110-N may also be directly connected via a direct communication path between the environments (not shown). Network 180 may represent any type of communication configuration that allows environments 110-1 to 110-N to exchange information. For example, network 180 may be a Local Area Network (LAN), a Wide Area Network (WAN), and a combination of networks, such as the Internet. Further, network 180 may include the infrastructure that allows environments 110-1 to 110-N to exchange information using wireless based communications.

Detail Description Paragraph:

[0028] Environments 110-1 to 110-N may also represent a main office business entity that manages the sale, production, storage, etc., of items located and sold in other environments 110. For instance, several environments (e.g., 110-1) may represent a retail outlet store, such as a supermarket, that sells items directly to consumers (i.e., users) and environment 110-N may represent a main office that manages the inventory and other business aspects of each of the several environments. In accordance with certain aspects of the present invention, one or more environments (e.g., 110-1) may perform intelligent inventory management based on item information collected by automated services performed within the environment(s).

Detail Description Paragraph:

[0029] To perform the intelligent inventory management services consistent with aspects related to the present invention, each environment 110-1 to 110-N may include an Intelligent Inventory Management System (IIMS) 105, a Data Collection System (DCS) 160, and item inventory 170. IIMS 105 may represent one or more computing systems, such as a server, personal computer, workstation, laptop, or any other similar computer system known in the art, that performs one or more processes consistent with certain aspects of the present invention. Although FIG. 1 shows IIMS 105 located within each environment, certain aspects of the invention enable the IIMS 105 to be located outside an environment as well. For instance, a department store chain may have several stores connected by a network to a single IIMS 105.

Detail Description Paragraph:

[0030] DCS 160 may be a configuration of hardware, firmware, and/or software that performs data collection functions consistent with certain aspects of the invention. In one aspect, DCS 160 includes components that collect item information from one or more items included in item inventory 170 using RFID technologies. Item inventory 170 may represent one or more items that are physically located within the respective environment 110. Item inventory 170 may also include one or more types of items that may or may not be similar in characteristics, size, price, taste, functionality, etc. For example, in the example that environment 110-1 represents a supermarket store, item inventory may include different types of food and beverages, with each type of item including a number of items. Thus, in the above example, environment 110-1 may include thousands of items of different types of beverages and other edible items. Alternatively, if environment 110-1 is associated with a home improvement warehouse retail store, item inventory 170 may include different types of tools, machines, appliances, etc.

Detail Description Paragraph:

[0031] For descriptive purposes in this application, the items described herein are associated with retail merchandise that is assumed to rest on store shelves that contain RFID antennae included in a respective environment 110. Each item may be associated with an RFID tag that includes item information associated with the respective item. For example, an RFID tag may include identification information unique to the item that the tag is attached, such as an a serial number or a price number. Alternatively, the RFID tag may include item information representing a type and/or associated characteristics of the item, and information identifying an environment the RFID tag is located (e.g., for scenarios where IIMS 105 is located outside an environment). DCS 160 may be configured to retrieve the item information from RFID tags associated with each item included in item inventory 170 and provide the information to IIMS 105.

Detail Description Paragraph:

[0032] Other types of information retrieving mechanisms may be implemented within environment 110-1 associated with the antennae, including pegboard displays, garment racks, shelf-end displays, cabinets, kiosks, backroom or warehouse racks, display cases, and point of sale or checkout lane equipment. Further, although the following description of certain aspects of the invention involves RFID based shelf units, one skilled in the art will appreciate that the present invention can be applied as well with RFID readers associated with POS locations (e.g., checkout lanes), warehouse racks, portal areas, etc. The characteristics of the antennae (e.g., form factor), and the rate at which antennae are read, may require adjustment for use in applications other than shelves. For example, warehouse applications might require longer read range and less frequent data updates, while point of sale applications may require very fast data updates with possible lower read ranges. The type and functionality of the RFID-based components and systems that may be implemented with methods and systems consistent with the present invention is described in the previously mentioned U.S. patent application Ser. No. _____ (Attorney Docket no. 089137/0110), which is incorporated by reference in its entirety.

Detail Description Paragraph:

[0034] As described, system 100 allows item inventories 170 to be intelligently managed by one or more environments 110. FIG. 2 shows a block diagram of an exemplary environment 110-1 consistent with certain features of the present invention. As shown, environment 110-1 may include IIMS 105, a Request Response Manager (RRM) 220, and DCS 160.

Detail Description Paragraph:

[0036] Database 215 may be one or more storage device systems that store information used by IIMS 105 to perform the intelligent inventory management features consistent with the present invention. Database 215 may be controlled by a database server (not shown), such as an SQL database server. Further, a Java DataBase Connectivity (JDBC) driver for the SQL server may be used to access the SQL server database. Database 215 may store information associated with each identifier included in the RFID tags. Thus, for each Stock Keeping Unit (SKU) (i.e., information associated with an item reflecting at least a certain type of product (e.g., item type), made by a certain manufacturer, in a certain size, color, style, etc.), the item information stored in database 215 may be selected from:

Detail Description Paragraph:

[0039] 3) An indicator of a seasonality of the item. A seasonality indicator may represent a relationship between an item and a period of time associated with different events or seasons, such as holidays, a time frame surrounding a certain date of a special event (e.g., the Super Bowl), etc. For example, a soap product may have a seasonality indicator representing no seasonal characteristics, such as "no season," wreaths may have a "Christmas" indicator, charcoal may have a "summer"

indicator, etc. Further, promotional items (e.g., those items that are being specially marketed by a manufacturer or retailer) may have a seasonality indicator associated with a time frame, such as "July 2003," etc. The seasonality indicators may be used by ISSA 200 and/or a user to determine when to remove or restock certain items in item inventory 170.

Detail Description Paragraph:

[0040] 4) A shelf life of the item. A shelf life may be a period of time that an item may be allowed to be included in item inventory 170. For example, perishable products, such as milk, may have a limited period of time that they may be presented on a shelf for sale to a customer. Non-perishable products may also have a limited period of time to be present in inventory 170 based on one or more factors, such as previous sales of items of a similar type, limited promotional time frames, etc.

Detail Description Paragraph:

[0041] 5) Historical data about the sales rate of each type of item. The historical sales data may extend back a certain period of time, such as a certain number of days, hours, etc. The historical sales data may be formatted in such a manner that provides information reflecting a quantity of sold items of a given type over a period of time, such as a table including a column of sales data having 168 rows representing 7 days multiplied by 24 hours. The column may have fewer rows for an environment that operates less than 24 hours per day, such as a retail store or business that is not open round-the-clock. Further, database 215 may include additional columns of sales rate data for an item, for example representing certain conditions, such as a standard price, a promotional price, a holiday season, a clearance condition, etc. Holiday seasons may be extended (e.g., Christmas) or short (e.g., Memorial Day, July 4, Labor Day, etc.). Other situations that may produce unusual selling patterns (e.g., accelerated selling patterns) include the Super Bowl, or the days before predicted severe weather such as a blizzard or hurricane.

Detail Description Paragraph:

[0042] 6) Historical out-of-stock data representing one or more conditions when a type of item has been unavailable in item inventory 170.

Detail Description Paragraph:

[0066] 6) tblEPCSKUBase--a table that stores information regarding a base level inventory for an EPC reader device (e.g., reader 262) and any item types associated with the reader.

Detail Description Paragraph:

[0067] 7) tblERPInv--a table that stores information associated with a current theoretical inventory (e.g., a planned or proposed inventory that should be present in environment 110-1 as opposed to actual inventory) provided by an Enterprise Resource Planning system (ERP) or other types of inventory systems. An ERP system is a business management system that integrates many facets of a business, including planning, manufacturing, sales, and marketing, such as those ERP systems provided by SAP, Oracle, and PeopleSoft.

Detail Description Paragraph:

[0068] 8) tblInventoryAlertConfig: a table that stores configuration items for an inventory alert job (e.g., a task performed by IIMS 105 that provides alert messages based on one or more inventory conditions).

Detail Description Paragraph:

[0069] 9) tblInventoryRemovalAlertConfig: a table that stores configuration data for an Inventory Removal Alerts process.

Detail Description Paragraph:

[0070] 10)tblManu--a table that stores information associated with one or more manufacturers of items included in inventory 170.

Detail Description Paragraph:

[0084] ISSA 200 may be an application program, such as a web-enabled application, that provides information to a user, or to an ERP system. Accordingly, ISSA 200 may be configured to receive data from, and supply data to, a user or an ERP system (or other types of business management systems). ISSA 200 may temporarily store inventory data collected from DCS 160 in database 215 before transferring portions of the data to the user and/or an ERP system. In one aspect of the invention, a user may customize ISSA 200 to determine how much inventory data is managed and stored in database 215 and how inventory data is kept in an ISSA system located at another environment, such as environment 110-N.

Detail Description Paragraph:

[0089] Out of stock control task 231 provides management functions to ISSA 200 associated with item inventory 170. For example, out of stock control task 231 may perform an inventory process that determines, on command and/or periodically, a physical inventory of items included in some or all of inventory 170, such as an actual inventory of items currently resting on a store shelf. Task 231 may allow a user (e.g., customer, employee, etc.) to request and view the results of the inventory process on a display device, such as peripheral device 255 or display 204. Task 231 may determine whether any item types are out of stock (e.g., not available for purchase by a customer because no items of that type are positioned in a location that the customer may collect and purchase). Task 231 may create a list of these out of stock item types and prioritize them based on or more factors, such as lost profits due to the item type being out of stock for a previous period of time (e.g., last month), lost profits due to the item type being out of stock at the time the out of stock condition was determined, availability elsewhere in environment 110-1 (e.g., in a back storage room), and sale term (e.g., a new release of a popular DVD, snow shovel sales during a blizzard, etc.).

Detail Description Paragraph:

[0090] Additionally, out of stock control task 231 may perform an item misplacement process that creates a log of any items that are positioned in an incorrect location within environment 110-1, such as when an item is placed on a wrong shelf. Further, task 231 may generate and/or forward a misplacement alert message when an item is determined to be misplaced. Also, task 231 may perform a shelf count threshold process that allows a user and/or ISSA 200 to receive and/or be alerted in the event of, an indication of any item types that have a shelf count below a threshold value for a given location. A shelf count represents a number of items of a certain type that are actually present in a given location associated with the item type. For example, in a supermarket, a certain shelf may be assigned to a type of item (e.g., canned soup). The shelf count of the exemplary item type would represent how many items of a particular type are located in the assigned shelf. In one aspect of the invention, the threshold value may be determined by a user and/or calculated by ISSA 200 based on one or more conditions, such as how many items of the certain type were previously removed from the given location during the same day, a week earlier, during the hours from a present time until the environment 110-1 is no longer open to customers, and/or until a next scheduled restocking of the item type. Also, the threshold value may be adjusted by one or more factors representing certain conditions associated with the item or external conditions, such as whether the item type is exposed to a sale promotion, a holiday shopping season, a time frame corresponding to a special event (e.g., the Super Bowl, weather conditions etc.).

Detail Description Paragraph:

[0091] In addition to providing feedback to ISSA 200 and/or a user regarding inventory conditions associated with one or more item types in inventory 170, out of stock control task 231 may also determine how much revenue (e.g., money) is

being lost as a function of a certain period of time (e.g., lost revenue per hour) based on an item being out of stock (e.g., unavailable to a customer for purchase). Also, out of stock control task 231 may determine one or more factors that may influence the sale of items of a particular type. These factors may include, but are not limited to, pricing of the items of the item type, seasonal characteristics associated with the sale of the items, and sales of other types of items included in inventory 170.

Detail Description Paragraph:

[0092] Out of stock control task 231 may also determine one or more alternate locations within, and/or external to, environment 110-1 that a type of item may be repositioned based on previous sales associated with the item type and/or whether the item type is out of stock. Further, when an item type is determined to be out of stock, task 231 may generate a message to be displayed on a display device reflecting the out of stock condition. The out of stock message may also include other information, such as an apology for the out of stock condition, an offer for a discount of the sale price of another item of a type similar to the out of stock item type (e.g., store or generic brand product), a rain check for the out of stock item, and directions to an alternate environment (e.g., nearby store) that includes an item of the same type in its inventory and the item's price.

Detail Description Paragraph:

[0094] Shrinkage task 232 may perform processes that manage the shrinkage of items included in inventory 170, such as the loss of inventory through theft, bookkeeping errors, and misplacement. In one aspect of the invention, shrinkage task 232 may perform a process that determines, and/or allows a user to receive information reflecting, when physical shelf inventory and/or theoretical shelf inventory are off by a certain percentage. Theoretical shelf inventory represents a value determined by ISSA 200 corresponding to an inventory of items that should be located in a particular location in environment 110-1. For example, in a case of high-value merchandise, a user may wish to know when the physical and theoretical inventory quantities are different by only one unit. Further, shrinkage task 232 may perform a process that determines, and/or allows a user to view, which locations of environment 110-1 are experiencing the greatest shrinkage. Also, task 232 may perform a process that determines, and/or allows a user to view or be alerted, when items are removed from the shelf in a predetermined quantity, such as a quantity defined by a store manager. The predetermined quantity may represent a large quantity of items that are removed in a relatively short time, which may possibly indicate a theft condition. The removal of a large quantity of items, however, may also denote an exceptionally good customer deserving immediate customer service. Accordingly, shrinkage task 232 may record a detected shrinkage condition in a log and may send an interrupt signal to one or more peripheral devices, such as silent alarms, flashing lights over a gondola, a camera or video time stamp, or an audio "thank you message." Further, shrinkage task 232 may create and provide a message to a user (e.g., sales clerk, employee of environment 110-1, etc.) that includes information to dispatch the user to the area to offer assistance to a "valued customer."

Detail Description Paragraph:

[0096] Rapid recall task 233 may perform one or more processes that allow a user or business entity (e.g., retailer, item manufacturer, etc.) to trace items based on critical data, such as lot number, age, etc. Task 233 may determine and provide information about an item or items that may need to be removed from a shelf, or whose sales should be accelerated for other reasons. For example, certain types of items may have an associated expiration date determined by their manufacture, such as pharmaceuticals, health and beauty products, and perishable goods (e.g., foodstuffs). Although some of these items may still be safe (and pharmaceuticals still be effective) for some time beyond the expiration date, accepted practice may be not to sell the items after their expiration date. Therefore, shrinkage task 233 may identify items that are approaching an expiration date and provide information

to a user that indicate the expiration date condition. Further, task 233 may provide suggestions to promote the sale of these items before their expiration date, such as determining an alternate location in, or outside, environment 110-1 that has a history of higher item sales (e.g., a front of a shelf), and/or suggestions to sell the items at lower prices.

Detail Description Paragraph:

[0097] Also, task 233 may provide information to a user when an item or items have expired so that the items may be removed from inventory 170. Rapid recall task 233 may also provide information associated with purchase planning for item types. For example, an item type that is not selling well (e.g., sales of the item are not reaching expected levels) before its corresponding expiration date may be indicative of excess inventory. Accordingly, task 233 may provide information that reflects a relationship between previous sales of an item type and expiration dates for items of that item type.

Detail Description Paragraph:

[0098] Additionally, rapid recall task 233 may access database 215 to collect shelf life information associated with each item in inventory 170. Shelf life information may represent an approximate useful life of an item, which may be determined from an expiration date for certain types of items. Alternatively, shelf life may represent a usual turnover time for the item, regardless of its useful life or expiration date. Task 233 may determine when an item has exceeded its shelf life and provide an indication of this condition to a user, via a display device (e.g., display 204).

Detail Description Paragraph:

[0099] Rapid recall task 233 may also access database 215 to collect time-stamped temperature data associated with certain items in inventory 170. The temperature data may reflect a temperature value of an area proximate to a one or more items stored in environment 110-1, such as a refrigerated shelf unit. Rapid recall task 233 may use the temperature data to calculate a reduced shelf life or predict spoilage for temperature dependent items, such as milk. Further, task 233 may provide and/or forward an alert message to a user that reflects a condition when the temperature of a particular area (e.g., refrigerated shelf unit) falls below an acceptable level for any items stored in the area.

Detail Description Paragraph:

[0101] Rapid recall task 233 may also determine which items have been modified by a manufacturer or supplier and, based on this determination, provide information reflecting possible actions that may help move older inventory. For example, products (i.e., items) sometimes undergo a style change, such as a new package style, a different size, a color change, a flavor change, etc. While the existing product is still good, a retailer may want to sell off existing older stock as soon as possible because customers may be reluctant to purchase a perceivably older product. Accordingly, rapid recall task 233 allows the retailer to locate such restyled merchandise and to move it to more marketable locations, such as onto the sales floor, in the front of shelves, and/or offer the merchandise at a discounted price to move the older merchandise from inventory 170.

Detail Description Paragraph:

[0102] Items also may be defective when they arrive in environment 110-1. In the case of pharmaceuticals, it may be imperative to remove the item immediately to prevent possible health risks. These items may be destroyed at environment 110-1 or returned to the manufacturer. Further, a defective item may need to be recalled by the manufacturer. Accordingly, removing the defective item from inventory 170 before it is purchased may save time for a retailer and the customer, as well as permit the item to be returned to the manufacturer intact in its original package. Rapid recall task 233 may perform one or more processes that address these types of situations. For example, in some cases, an item may have a defect that renders it

less valuable, while not constituting a health or safety risk, such as an item with a missing part, a cosmetic defect, a mismatched part, etc. A manufacturer may be able to identify these items after they have been delivered to environment 110-1 based on an identification number associated with the delivery (e.g., lot numbers). However, once a large number of items are warehoused and/or shipped, different lots may become mixed together and the retailer may have problems identifying the items affected without opening the packages. However, with the RFID tagging features associated with certain aspects of the present invention, the manufacturer may identify a range of RFID serial numbers that were incorrectly packaged. Environment 110-1 may receive these serial numbers and allow ISSA 200 to identify the defective items in inventory 170. Rapid recall task 233 may perform a process that searches database 215 for items associated with the received serial numbers for the defective items and provide this information to a user, perhaps through display 204 or other peripheral devices. The user may then offer customers various marketing incentives to move the defective items from inventory 170. For example, a customer may be offered a discount on a defective item for purchasing it "as-is." Upon sale of the product, a cashier may either take the customer's name and address and relay this information to the manufacturer, or the customer may be given a key number with which to order a missing part free of charge from the manufacturer, such as through the Internet. Alternately the known missing part may be shipped to the retailer to be handed out as a free "service package." Procedures like these would save the manufacturer shipping and handling costs involved in returning the entire package. Further, a retailer might even use this feature to offer a special discount to a customer willing to purchase an "open carton" or such as product returned by another customer, that may lack items not due to manufacturer's fault. Using the RFID tagged items, a retailer may offer a special discount on packages damaged in the retailer's inventory 170, without worrying that unscrupulous customers might damage good boxes on the shelf and seek to obtain a discount.

Detail Description Paragraph:

[0103] Additionally, certain types of items, such as software products, often contain known errors or "bugs," that may require a remedial "corrective patch." For example, a computer readable medium (e.g., CD-ROM, DVD, magnetic disk, etc.) including one or more programs and data may require a revision comprising only a few megabytes that can be downloaded over the Internet. Rapid recall task 233 may identify these types of defective items using the RFID tags 280 in inventory 170. Consequently, the retailer and/or manufacturer may offer a customer a small discount to purchase an "out-of-date" or "buggy" product, with the customer understanding that the product may be brought up to specification with a few minutes' time on the Internet to download the corrective code. Further, environment 110-1 may provide one or more workstations that a user may use to download the corrective code while in environment 110-1.

Detail Description Paragraph:

[0107] Other features task 235 may perform one or more applications associated with advertising, price sensitivity, sales optimization, automatic pricing, and customer information and services.

Detail Description Paragraph:

[0108] In one aspect of the invention, other features task 235 includes an Advertising, Price Sensitivity, and Sales Optimization (APSSO) application that determines relationships reflecting how advertising (e.g., marketing and/or presentment of items) and/or price influences the sales or possible sales of items or item types that are presented to customers that interact with inventory 170. This application may create, on demand or periodically, a summary of how often an item or items of a certain type are physically moved from their current location in environment 110-1, such as when an item is taken off of a shelf and replaced. Thus, the APSSO application may request and receive periodic inventory updates of inventory data reflecting a current inventory of items in inventory 170. The APSSO application may leverage the out of stock task 231 to collect the inventory

information, or alternatively send commands to inventory request interface 250 to collect the information itself, such as requesting an inventory reading a shelves contents at least every few seconds. The APSSO application may compare the collected inventory information to sale rate data associated with the items corresponding to the collected inventory information to provide an indication (e.g., a ratio) of a number of item examination events per single purchase event. The indication, or ratio, may describe how much attention an item is getting from customers, as opposed to the rate of item purchases. The data could be correlated with location information associated with the item, for instance, whether the item was at eye level, on a shelf-end display, positioned in the front of a store, positioned in a promotional display, positioned in the back of the store, etc.

Detail Description Paragraph:

[0111] In one aspect of the invention, the APSSO application may interact with an expert system (internal or external to IIMS 105) to analyze historical data on cross-item or correlated sales, sales velocity (i.e., how rapidly or slowly are items being sold and their respective inventory being depleted), price-sales sensitivity (e.g., a relationship between previous sales of an item type and sale price events for that item type), seasonality, etc., to suggest improvements in store layout and shelf organization. That is, the expert system and/or the APSSO application may determine and provide suggestions to a user via a peripheral device on alternative locations for certain item types based on the above analyzed information.

Detail Description Paragraph:

[0112] Other features task 235 may also include an Automatic Pricing Application (APP) that performs processes that manage the sale price of an item. In one aspect of the invention, the APP may receive and/or collect price plans from database 215 (or any other memory device that may store these plans) and automatically update a displayed item sale price on a display device (e.g., an LCD mounted on a shelf supporting the item). A price plan may represent a price schedule for certain or all item types in inventory 170 that is generated by a price plan process executed by a computing device (e.g., IIMS 105) or generated by a user (e.g., retail store manager). For example, an exemplary price plan may include scheduled promotions that suggest reducing the price of certain item types based on these promotions. Further, a price plan may consider season or time dependent conditions, such as holidays, weather conditions, etc., to determine how to modify the price of an item type. For instance, the price plan process may collect periodic weather information from a server system that accesses and stores current weather data for a surrounding area proximate to environment 110-1 (e.g., 50-100 mile radius, city limits, etc.) The price plan may use the collected weather information to determine whether the sale price of certain items (e.g., snow shovels, stock wood studs, etc.) should be adjusted. Alternatively, a user (e.g., store manager) may collect, or automatically receive, the weather information and adjust the sales price manually through the price plan process and/or the APP.

Detail Description Paragraph:

[0113] The APP may also correlate, in real time, the price of a target item with the age of the shelf inventory associated with the target item, an amount of items of the same type as the target item in theoretical inventory, and the sales velocity of other item types whose sales correlate with the sale of the target item. The APP may generate a report reflecting the correlation(s) and provide the report on demand or on a scheduled basis to a peripheral device (e.g., storage device, display device, printer, etc.).

Detail Description Paragraph:

[0114] The other features task 235 may also include a Customer Information and Special Services Application (CISSA) that performs processes that provide users (e.g., customers shopping in environment 110-1) with assistance in locating an item of interest under a variety of special circumstances. In one aspect of the

invention, the CISSA may also provide item inventory availability information to remote users (i.e., customers). For example, a user remotely located from environment 110-1 may access a web site hosted by a server operated in association with environment 110-1 through network 180. Using the web site, the user may request the availability of one or more items of one or more types at environment 110-1 (e.g., is an item in inventory 170). The CISSA may receive the request from the computer server and determine whether the request items are available in inventory 170. In one aspect of the invention, the CISSA may access database 215 to collect inventory information collected by out of stock task 231. Alternatively, or additionally, the CISSA may request a search for the requested items throughout environment 110-1 by providing one or more commands to RRM 220 and DCS 160.

Detail Description Paragraph:

[0115] Further, the CISSA may generate a request for the availability of the requested items at one or more remote environments (e.g., environment 110-N) and receive back a response indicating whether the requested item(s) are available at these respective locations. In this scenario, the remote environment may perform a local inventory search process to determine whether the item is currently in stock. Based on the local search, the remote environment may provide a response message to environment 110-1 indicating the result of the local search (e.g., the item is or is not available at that location). Alternatively, remote environments may periodically provide their current inventory data to environment 110-1. ISSA 200 may receive and store this received information in a database (e.g., database 215) for access by the CISSA as needed.

Detail Description Paragraph:

[0117] Additionally, the CISSA may provide the same item availability functions described above through computing devices located within environment 110-1 (e.g., kiosks located in a store). For example, when a customer arrives at a store (e.g., environment 110-1) expecting to find a particular item and is disappointed to learn the item is out of stock, the customer may request the item's availability using a kiosk located within the store. In addition to one or more alternative store addresses that have the item in stock, the kiosk may display to the customer an offer for an inconvenience discount (e.g., a cents off coupon for the item or perhaps another item). The customer may accept the discount by, for example, providing a simple code word/number of their choice. The discount will be valid for a limited period of time and the customer need only use the chosen word/number within 24 or 48 hours this code word/number will entitle them to the discount at the alternative stores. Further, the CISSA may also provide alternate location information on a display device mounted on a shelf unit supporting an item or group of items. For example, for any item that is not in stock, the display device may display the location of, and/or directions to, the nearest alternate location (e.g., store) that currently includes the item in inventory. For items which are not out-of-stock, the display device may show the item price instead of alternate locations. As described above, the alternate locations may be determined based on these locations performing, on a periodic or a demand basis, an inventory search for the requested item.

Detail Description Paragraph:

[0121] ISSA 200 may also include one or more inventory request interfaces 250 that collects RFID tag reader events and may receive data and/or requests from business layer 230 and request response manager 220. The exchange of commands, data, and/or information within environment 110-1 denote a typical information flow, which may be associated with a higher level entity, such as inventory request interface 250 sending a command to a lower level entity such as DCS 160, and in return, receiving data from the DCS 160. Further, the information flow may also be reversed. For example, DCS 160 may request information from ISSA 200, such as antenna tuning data, or may report certain events ISSA 200, such as a malfunction in one or more components (e.g., antenna 270). Interface 250 may be an Active Server Page (ASP) that other applications may send HTTP information. Interface 250 may receive EPC

data from RRM 220 and send EPC eXtensible Markup Language (XML) data to a message queue that is set up for each reader 262 in DCS 160.

Detail Description Paragraph:

[0125] The database 215 tier may store data used to perform one or more inventory management processes consistent with certain features of the invention. In one aspect of the invention, there may be no business logic in this tier, that enables IIMS 105 to implement multiple types of databases. Database 215 may be accessed using different types of database languages, depending on the architecture the database is configured upon. For example, Structured Query Language (SQL) commands via ActiveX Data Objects (ADO) and/or Open DataBase Connectivity (ODBC) over Transmission Control Protocol/Internet Protocol (TCP/IP). Further, to prevent mismanagement of the information, database 215 tier may be configured to allow access only by business logic tier 230.

Detail Description Paragraph:

[0127] RRM 220 may be an application that is executed by a computing system (e.g., an RRM system (not shown)) to provide a bridge (i.e., interface) between high level components (e.g., software such as ISSA 200) and lower level components (e.g., hardware/firmware, such as DCS 160). Although FIG. 2 shows RRM 220 as a separate component, RRM 220 may be stored in memory 202 and executed by CPU 201. In one aspect of the invention, RRM 220 may communicate between inventory request interface 250 and one or more primary controllers 260, located in DCS 160, or primary controller proxies (not shown) located within RRM 220, which perform data handling or analysis on information collected from RFID tags 280 in inventory 170. RRM 220 may include a user interface that allows a user to view a current status of RRM 220. The user interface may be accessed from IIMS 105 which may execute RRM 220.

Detail Description Paragraph:

[0128] In one aspect of the invention, RRM 220 may load XML configuration documents from an RRM configuration interface (not shown) included in ISSA 200. The configuration file may include one or more event lists and/or command lists, which are a list of events provided by DCS 160 and commands provided by ISSA 200, respectively. RRM 220 may create a request broker 222 for each event list in the configuration file from a configuration XML document provided by ISSA 200 (e.g., inventory request interface 250). Alternatively, RRM 220 may create a primary controller proxy (not shown) for each event list. A primary controller proxy is further explained below with respect to DCS 160 and primary controller 260. Also, RRM 220 may create one or more response brokers 224 that handle responses from one or more primary controllers 260 or primary controller proxies included within RRM 220. A response broker 224 may also send acknowledgment and/or failure information to request broker 222 indicating whether a response has been properly received from primary controller 260. In one aspect of the invention, response broker 224 may initiate an object-oriented class based on a reader 262 that receives read data and converts it to an EPC XML document. Response broker 224 may also send the EPC XML document to ISSA 200, if available. If the ISSA 200 is not available at that time, response broker 224 may store the EPC XML document in a queue until ISSA 200 is available.

Detail Description Paragraph:

[0133] In one aspect of the invention, ISSA 200 may request data (e.g., provide a read command) on demand (e.g., requests with response times of a few seconds or less) or periodically, such as requests that are initiated automatically on set schedules (e.g., every minute, hour, day, etc.). DCS 160 may acquire the requested data from RFID tags 280 through one or more antenna 270. The rate of acquisition of the data may be based on the number of RFID tags 280 included in inventory 170. Thus, for example, DCS 160 may collect the requested data within a few seconds for an inventory including a few hundred of tagged items or within a few minutes for much larger inventories, such as those including thousands of RFID tagged items. It

is the responsibility of RRM 220 to manage the collection of the data through the components operating within DCS 160. For example, RRM 220 may be configured to sequentially provide a query for requested data to several RFID tag reader devices (e.g., reader 262) that are dedicated to collecting item information from RFID tags positioned in different locations within environment 170. DCS 160 and RFID tag data collection

Detail Description Paragraph:

[0134] DCS 160 may be a collection of hardware, firmware, and/or software that perform data collection functions consistent with certain aspects related to the present invention. DCS 160 may include a primary controller 260, one or more readers 262, and one or more secondary controllers 266. DCS 160 may control one or more antenna 270 that are associated with (e.g., mounted on) corresponding support structures (e.g., shelf units) from which one or more items rest. The items in inventory 170 may each be tagged with RFID tags 280 that include item information, such as an EPC reflecting various characteristics associated with the respective item. When a corresponding antenna 270 is activated by DCS 160, information within any RFID tags 280 located within a readable proximity of the activated antenna may be retrieved and provided to DCS 160. The RFID tags 280 respond to RF energy emitted by antenna 270, and this response is sensed by reader 262, which returns digital serial data to the primary controller 260. The digital serial data may be parsed by primary controller 260 and then returned to response broker 224 for further processing by ISSA 200.

Detail Description Paragraph:

[0135] Primary controller 260 may be a device and/or process that monitors for and receives requests (e.g., commands) from request broker 222 and consequently generates a series of corresponding commands specific to a reader 262 that environment 110-1 may be using to access particular items in inventory 170. In one aspect of the invention, the commands provided by a request broker 222 may be formatted in accordance with a network protocol, for example, the TCP/IP protocol. Primary controller 260 may send the received commands (e.g., TCP/IP packets) to reader 262 and/or one or more secondary controllers 266. In another aspect of the invention, controller 260 may pass the commands to reader 262 and/or one or more secondary controllers 266 in the form of RS-485 or other types of serial communication protocols. Table I shows a list of exemplary commands that primary controller 260 may provide to reader 262 and/or secondary controllers 266.

Detail Description Paragraph:

[0136] Primary controller 260 also monitors for a response from reader 262 and/or secondary controller 266 that was sent one or more commands. Based on whether a response is received and the type of response, primary controller 260 may generate and send acknowledgment, non-acknowledgment (e.g., failure), and/or read information to response broker 224. The read information may include EPC information associated with the RFID tags 280 in inventory 170. For example, primary controller 260 may provide one or more EPC numbers to response broker 224 each time a read operation is completed by reader 262. Alternatively, primary controller 260 may store the EPC numbers temporarily in a memory device (not shown). Once a certain number of RFID tags 280 for one or more antennae 270 have been read by reader 262 (e.g., all of tags, a portion of the tags, etc.), primary controller 260 may also perform a batch transfer process that provides the read data (e.g., EPC data) all at once, or in groups, to response broker 224.

Detail Description Paragraph:

[0139] Reader 262 may be one or more of any type of off-the-shelf RFID readers provided by many different manufacturers, such as the I-CODE reader provided by Philips®. More than one type of reader 262 may be implemented within DCS 160, as long as primary controller 260 (or an equivalent device dedicated to communicate with reader 262) is configured to communicate with the reader 262 (e.g., provide valid commands and properly interpreting returned data). Although FIG. 2 shows

reader 262 as a separate component within DCS 160, primary controller 260 and reader 262 may be physically combined in a single electronic entity. Depending on the type of environment 110-1 and/or item inventory 170, one, several, several hundred, etc. readers 262 may be used by DCS 160 to collect item information from inventory 170. Although each reader 262 may be associated with its own primary controller 260, a single primary controller 260 may be assigned to work with one or more readers 262 to facilitate collecting item information from inventory 170.

Detail Description Paragraph:

[0141] Besides communicating with reader 262, primary controller 260 also communicates with one or more secondary controllers 266. Secondary controller 266 is a computing device and/or process that may select one or more antennae 270 by controlling electronic components that act as switches to activate or deactivate a corresponding antenna 270. Each secondary controller 266 may be physically located proximate to and connected with a group of antennae 270, such as several antennae contained within a shelf or localized fixture that store items included in inventory 170. For example, environment 110-1 may have hundreds of secondary controllers 266 and thousands of antennae 270. Further, secondary controller 266 may also, upon receiving one or more commands from primary controller 260, operate a peripheral device 255 to display item information from RFID tags 280 included in item inventory 170 and/or provide inventory information to a user. For example, peripheral device 255 may be a display mounted on a front edge of a shelf that supports one or more items. Alternately, peripheral device 255 may be connected directly to a serial data bus that communicates between primary controller 260 and secondary controller 266. Further, peripheral device 255 may be connected to a dedicated bus that is not tied to secondary controllers 266 (e.g., USB). Besides output devices such as displays, peripheral device 255 may include an input/output device, such as a bar code reader or any other type of device that may plug into a shelf to facilitate data collection/retrieval from items with or without RFID tags 280. For example, a user may use such a bar code scanner to collect and read the UPC number for an item and to associate an EPC number with UPC numbers already in a database. Accordingly, in circumstances where one or more items are received by environment 110-1 without an RFID tag 280, the scanner may be used to facilitate associating a non-tagged item with a UPC or EPC. Also, peripheral device 255 may be a monitoring device that connects to an interface mounted on a shelf unit. The monitoring device may perform checking functions, such as checking the status of any antennae in the shelf unit and items resting on the shelf.

Detail Description Paragraph:

[0143] One task of secondary controller 266 may be to switch antennae 270 mounted within a single shelf unit (or similar support unit) storing one or more items from inventory 170. Also, secondary controller 266 may be used to communicate information to and from a user (e.g., customer, retailer employee, etc.). For example, secondary controller 266 may receive from ISSA 200 (via database 215) item information about each item known to be on a shelf served by secondary controller 266. This item information may include current price, size, weight, unit price, and/or sale status (e.g., discount on a current sale price). The item information may be displayed on peripheral device 255, such as a shelf edge display. If there is more than one type of item on the shelf, there may be multiple shelf edge displays mounted on or near the shelf. Alternately, information for each item type might cycle sequentially on a single display, pausing for several seconds before continuing to the next item type. The shelf edge display may be provided with a user interface button to temporarily halt the display cycle and to request additional information about the product being displayed when pressed by the user. Also, if ISSA 200 senses an item being removed from the shelf based on data provided by DCS 160, it may instruct secondary controller 266 to display information associated with that item on the peripheral device 255.

Detail Description Paragraph:

[0144] Secondary controller 266 may also be configured to facilitate other

interactive operations between ISSA 200 and a customer. In one aspect of the invention, a customer may be provided with an RFID-based customer card that includes an RFID tag containing information concerning or identifying a customer. The customer identification information may be related to information stored in database 215 or another memory device that maintains customer information, such as a current shopping list provided by the customer (via the Internet and browser software, kiosk device, etc.), and profile information associated with the customer and/or the customer's family members (e.g., clothing sizes, brand preferences, etc.). When a customer carrying a customer RFID card enters and moves throughout environment 110-1, the presence of the customer card in the vicinity of a shelf equipped with the RFID antenna associated with secondary controller 266 may cause a signal or data to be passed to ISSA 200 through primary controller 260. In response to the signal or data, ISSA 200 may direct secondary controller 266 to display information about an item at the shelf that detected the customer card, such as through peripheral device 255. In this instance, ISSA 200 may access database 215 to collect any customer information associated with the identifier corresponding to the detected customer card. ISSA 200 may then determine whether any items or types of items located near or at the shelf that detected the card relate to the customer information stored in database 215. For example, ISSA 200 may determine whether an item is included in a shopping list created by the customer and/or relates to a list of preferred products for the customer. Further, ISSA 200 may provide additional information to secondary controller 266 for display on peripheral device 255, such as the availability of the customer's size in the case of a clothing item, the availability of a rebate for an item, and the availability of sales or rebates for other items.

Detail Description Paragraph:

[0146] ISSA 200 and RRM 220 may also communicate with DCS 160 that is located at POS locations, such as checkout lanes. At these locations, ISSA 200 may interact with the POS system to facilitate certain sales transactions. For example, ISSA 200 may automatically register an item having a warranty with a manufacturer by using serial number information obtained from the EPC number of the item and/or customer identification information (e.g., name, address, etc.) collected from an RFID (or conventional) customer card. The customer may be given an option whether to accept the registration at the checkout lane, or to defer it until later.

Detail Description Paragraph:

[0148] In one aspect of the invention, reader 262 may send RF energy through an RF bus (e.g., cable) to antennae 270 through secondary controller 266. A single antenna 270, or a group of antennae 270 located adjacent to one another and working in concert, may be activated and operational at a given time based on signals provided by secondary controller 266 and/or reader 262. The active period for a given antenna 270 may be based on the amount of time it takes to collect information from RFID tags 280 located in proximity to the antenna 270. Secondary controller 266, under directions from the primary controller 260, may select and activate each antenna 270 in turn. The order in which antenna 270 are selected may be optimized so that the reader 262 may be shared among many antennae 270. The sharing of reader 262 may allow DCS 160 to collect inventory data more or less regularly, as well as focusing immediate attention on antennae 270 where one or more items are being moved. In one aspect of the invention, ISSA 200 may determine which antenna 270 to activate based on one more prioritization factors. These factors may include:

Detail Description Paragraph:

[0151] 3) antennae 270 associated with one or more items known historically to have a high sales volume during a particular time period (e.g., time of day or week);

Detail Description Paragraph:

[0155] 7) antennae 270 that have one or more theft-prone items within their read range, such as high end merchandise items (e.g., jewels, etc.);

Detail Description Paragraph:

[0156] 8) antennae 270 that are expected to have a product of immediate interest to a user (e.g., employee or customer), such as when a user requests information reflecting whether a desired item is available "on shelf" or in a back inventory stock room;

Detail Description Paragraph:

[0157] 9) antennae 270 that are associated with one or more items that have passed through a POS terminal within a predetermined period of time (e.g., recent POS sales); and

Detail Description Paragraph:

[0159] One skilled in the art will appreciate that the above list of prioritizing factors is not intended to be limiting and ISSA 200 and/or a user may determine other prioritizing factors based on one or more variables and weighting factors associated with the characteristics of the items in inventory 170.

Detail Description Paragraph:

[0167] In one aspect of the invention, Jobs 240 may include an inventory limit job that runs periodically (e.g., every 60 seconds) and monitors inventory levels based on configurations that may have been set by a user through a user interface provided in interface 210 and stored in a configuration table within database 215. This job may generate an inventory out of limits alert if any inventory items are found to be out of bounds relative to the baseline inventory (e.g., current stock above and/or below a predetermined value). The alert may be generated using an alert method, such as the exemplary WebService ISSAserv/Alerts.asmx/NewInventoryAlertJob method described in Table II. In one aspect of the invention, the inventory limit job may direct a message provisioning service to send an e-mail to one or more predefined users each time an inventory out of limits alert occurs.

Detail Description Paragraph:

[0169] Jobs 240 may also perform a removal limit job that may run continuously and monitor items that have been removed from their designated locations (e.g., shelf) in a quantity and time period specified by a user via user interface 210. The removal limit job may generate and store information associated with the removed items in a table in database 215, such as an inventory removal table (e.g., tblInventoryRemove). Further, if this job determines one or more items that have been removed based on the specified quantity and time period values, this job may create a new alert message associated with this condition and insert into the alert table (e.g., tblAlerts).

Detail Description Paragraph:

[0170] Jobs 240 may also perform an expired products job that may run every day at a predetermined time (e.g., 12:01 a.m.), and determine whether any items have been located in inventory 170 have reached or exceeded their corresponding expiration limit (e.g., expiration date). If the expired products job finds an item that has been expired, or is approaching an expiration date, it may create a corresponding alert message and insert it into the alert table (e.g., tblAlerts).

Detail Description Paragraph:

[0172] Also, Jobs 240 may perform a manufacturer update job that may run periodically (e.g., every 10 minutes) that monitors a table in database 215 that is updated when an item is included in inventory 170 that is provided by a manufacturer that is not registered with ISSA 200 (i.e., a new manufacturer). This update job may retrieve information associated with the new manufacturer from the manufacturer's website or other type of external data source.

Detail Description Paragraph:

[0174] As the RFID tag industry grows, it is expected that items may be "source-

tagged." That is, the RFID tags 280 may be applied to items and the EPCs written to the tags by a manufacturer. There may be instances, however, when items are included in inventory 170 that do not include source tagged items. Accordingly, environment 110-1 may perform an EPC writer process that is designed to write EPCs to RFID tags 280. Since the EPC process may be configured to access data on a particular tag one at a time, the process may be performed by a system that is separate from ISSA 200. Alternatively, ISSA 200 may include a separate EPC writer process (in addition to, or in place of, EPC writer task 234) that is executed by IIMS 105.

Detail Description Paragraph:

[0176] In one aspect of the invention, inventory 170 may include one or more RFID enabled shelves that include communication capabilities with peripheral device 255, such as a bar code reader. Accordingly, each shelf may, at least temporarily or periodically, exclusively communicate with the EPC writer process. For instance, a group of items of a certain type may be placed on a shelf by a user (e.g., stock person). One of the items may be scanned with a bar code reader to determine its corresponding UPC number. The EPC writer may then sequentially assign EPC numbers to each item in the group by incorporating the information derived from the UPC number.

Detail Description Paragraph:

[0179] In such situations where a governing body has not assigned manufacturer's codes, the EPC writer may be used in an arbitrary pseudo-EPC field arrangement for use in initial inventory operations, such as trial inventory management processes that incorporate the current UPC field values or arbitrary values as the manufacturer's codes. However, if a standard EPC field arrangement has been implemented, the EPC writer may be used by environment 110-1 to ensure items are properly tagged. Also, if a standard EPC field arrangement is promulgated, the EPC writer may be used by retailers, distribution centers or manufacturers, possibly for limited product lines. One skilled in the art will appreciate that in the event RFID tagging becomes more widespread and "source tagging" by the manufacturer becomes common, use of the EPC writer may diminish at retail locations but increase at manufacturing sources, which may implement methods, systems, and articles of manufacture consistent with certain aspects of the invention.

Detail Description Paragraph:

[0188] User interface 210 may provide content-based interfaces to a user that enables the user to request and input information associated with the intelligent inventory management functions consistent with certain aspects related to the invention. FIG. 4 shows an exemplary interface map 400 that provides a framework that ISSA 200 may implement to respond to inquiries from a user via user interface 210. Each box in map 400 may represent a page process performed by user interface 210 that allows a user to request and/or receive information. Each page may check a security key carried in a session for a current user to determine whether the user is allowed access to the corresponding page. Further, each page may post an XML document to ISSA 200 and retrieve XML information. Also, content may be displayed on a display device (e.g., display 204) by applying style sheets to XML from COM+components described for each page. Further, the page process in map 400 may interact with corresponding one or more processes included in ISSA 200 (e.g., tasks 231-239) and jobs 240.

Detail Description Paragraph:

[0191] Stock level control page 414 allows the user to access various inventory level information by directing the user, for example, to View Live Inventory page 416. This page allows users to view the current physical inventory at a particular location, such as a shelf. The user may generate a query using various fields defined by user interface 210. Table V shows a list of exemplary search fields a user may use to filter a search. Once the query is entered by the user, interface 210 may display a search results for Live Inventory page 416 that initiates a

process (e.g., `WebService ISSAserv/OutOfStock.aspx/GetInventoryXML`) that allows the user to search and view information associated with an item. This process may allow the user to receive information from another page, such as an Item Detail page (not shown). In one aspect of the invention, a user who is a vendor with merchandise included in environment 110-1 may be given limited local or remote access to the View Live Inventory page 416 to ascertain whether their item is being displayed according to preset agreements. For example, the vendor may determine whether their items are presented on a certain number of shelf facings, located in a particular location within a store, whether their items are positioned in a preferred location within a set of shelves, such as at eye level as opposed to higher or lower levels, etc.

Detail Description Paragraph:

[0193] The View SKU Out of Limits page 418 allows a user to view information associated with one or more item types that are currently over or under an allowable percentage of baseline inventory. The user may be able to filter a search by using the fields shown in Table V. Once the filter information is entered by the user, user interface 210 may display a search results for SKUs out of limits page (not shown). This page may initiate a process (e.g., `WebService ISSAserv/OutOfStock.aspx/OutOfLimitsSK- UXML`) that shows a user a current inventory for a given item or item type at a current location. Further, the process may also provide the baseline inventory value for that item at the specified location, and the difference the current inventory deviates above or below the desired baseline inventory. Furthermore, the process may display the allowable percentage over and under for a given SKU and location. This out of limits information may be used by ISSA 200 to suggest which out-of-limits items to restock first based on expected sales information provided by a user and/or a software process that produces this information. ISSA 200 may also access current and historical sales data maintained in a memory device (e.g., database 215) to generate a report predicting expected times at which each item may become out of stock. Also, ISSA 200 may use various factors, such as pricing, seasonality, etc., to adjust the predicted information provided in the report.

Detail Description Paragraph:

[0194] The View Lost Sales page 420 may allow a user to view information associated with item types that have lost sales due to being out of stock. The user may be able to filter a search query for these SKUs using the fields listed in Table V. Once the filter information is entered, by a user, user interface 210 may display a search results for lost sales page (not shown). This page may initiate a sales estimation process that shows the user an estimate of the sales (e.g., in dollars) lost due to the items of the item type being out-of-stock. The estimate provided by the sales estimation process may be based on a comparison of inventory levels, sales volume (current and historical), and traditional correlation of sales events for similar types of items. For example, ISSA 200 may access inventory data, sales information, etc. from database 215 to perform the comparisons used by the sales estimation process. The estimate of out-of-stock lost sales may be also be based entirely on factors provided by a user (e.g., administrator, retailer manager, etc.) to describe substitution rates associated with the similar item types. Alternatively, ISSA 200 may be configured to train itself by recognizing trends associated with previous sales of these item types and mining it from a database including similar information.

Detail Description Paragraph:

[0196] Stock level maintenance page 424 directs the user to pages (e.g., 426 and 428) that allow the user to configure and/or view current inventory arrangements in environment 110-1. The View Shelf Arrangement page 428 may allow a user to view information regarding any item in inventory 170 and their corresponding currently assigned locations in environment 110-1. The user may be able to filter a search using the fields in Table V. Once the filter information is entered by the user, user interface 210 may display a current shelf arrangements page (not shown). The

arrangements page may perform a process (e.g., WebService ISSAserv/OutOfStock.aspx/SKUArrangement) that shows items and their allowable locations (e.g., locations in environment 110-1 that are assigned to the respective items). ISSA 200 may access item price and/or sales velocity data from a database (e.g., database 215) to provide prioritized locations within environment 110-1 that items of certain types may be placed to promote increased sales and/or movement of these items.

Detail Description Paragraph:

[0197] The Set Shelf Arrangement page 426 may allow a user to set a location for certain types of items, a category of items, items provided by certain manufacturers, a specific SKU number, and a particular range of locations within environment 110-1 (e.g., an aisle, a gondola, and/or a shelf). Page 426 may also allow a user to set the baseline inventory for each item type. Further, environment 110-1 may implement planogram software, which is a plan (e.g., a diagram, picture, etc.) that describes how and where products should be placed on retail shelves and displays. A planogram analyzes space utilization, provides financial data, along with other reports that permit retailers and manufacturers to effectively plan, set-up and manage their businesses to maximize profitability of retail space. Accordingly, the set shelf arrangement page may be downloaded from a planogram program executed by environment 110-1. Likewise, ISSA 200 may allow the planogram program to update current inventory information using the interface page information provided by the inventory data provided by the pages in map 400. Also, the planogram routine may be incorporated into ISSA 200 for execution by IIMS 105.

Detail Description Paragraph:

[0198] The Shrinkage Control page 430 directs the user to shrinkage information provided by pages 432 and 434. The View Over Removed Inventory page 432 may allow a user to filter items by individual items, by a category of items, items provided by a particular manufacturer, by SKU numbers that are in locations within environment 110-1, by particular locations within environment 110-1 (e.g., an aisle, a gondola, and a shelf number). Page 432 may allow the user to view the requested items that have been removed from their designated locations in a determined quantity within a certain period of time that may be specified by the user. It also displays an Over Removed Inventory Results page (not shown). This page may initiate a process (e.g., WebService ISSAserv/Shrinkage.aspx/MajorPullXML) that may show the location, item information, a time when a first item of the number of items was removed from the designated location, a time when a last item of the number of items was removed, and how many items were removed in that time period.

Detail Description Paragraph:

[0199] The View Actual vs. ERP Inventory page 434 may allow a user to receive information associated with items located in environment 110-1 that have a user defined percent variance over and/or under a defined inventory level. The user may filter a search of these items individually, by a category of items, by items provided by a particular manufacturer, and a SKU number that is in a location within environment 110-1, such as an aisle, a gondola, and a shelf number. Inventory page 434 may show an Actual vs. ERP Results page (not shown). This results page may initiate a process (e.g., WebService ISSAserv/Shrinkage.aspx/InventoryCompareXML) that may show the physical inventory present in inventory 170, such as those items located on shelves, a business defined inventory (e.g., an ERP inventory), and the percentage variance between the two.

Detail Description Paragraph:

[0202] The Find Serial Number page 442 may allow a user to view items within a certain serial number range. The user may be able to filter a search using the fields in Table V. Once the filter information is provided by the user, user interface 210 may display the Search Results for Live Inventory page, described above. This page may perform a process (e.g., WebService ISSAserv/OutOfStock.aspx/GetInventoryXML) that provides information regarding items

with corresponding serial numbers within the range specified by the user.

Detail Description Paragraph:

[0203] The Alerts page 444 may direct the user to one or more pages (e.g., pages 446-452) that allow the user to receive and/or set information associated with one or more types of inventory alerts. The Set SKU Inventory Alert page 446 may allow the user to set an alert configuration for items that drop below or go above a defined percentage of a base line inventory. Alert page 446 may allow the user to set the alert configuration for all items in inventory 170, for items of a particular type, for a category of items, for items provided by a manufacturer, and for particular SKU numbers that are positioned in particular locations within environment 110-1, such as an aisle, a gondola, and a particular shelf. Alert page 446 may initiate a process that performs the desired monitoring set by the user (e.g., WebService ISSAserv/Alerts.aspx/NewInventoryAlertJob).

Detail Description Paragraph:

[0204] The View SKU Inventory Alerts page 448 may show an alert configuration for the items and their corresponding locations in environment 110-1 that are currently being monitored by an inventory alerts process. Page 448 allows the user to remove inventory alert configurations that are no longer needed.

Detail Description Paragraph:

[0205] The Set Inventory Removal Alerts page 450 may allow a user to set an alert configuration for situations where a determined number of items are removed within a determined time period. Page 450 may allow the user to set these types of alert configuration for individual items, all items, for a category of items, for items provided by a particular manufacturer, and for items with a SKU number that may be in a location within environment 110-1, such as an aisle, a gondola, and a particular shelf. Page 450 may initiate a process that performs the configurations described above, (e.g., WebService ISSAserv/Alerts.aspx/NewInventoryRemovalJob).

Detail Description Paragraph:

[0206] The View Inventory Removal Limits page 452 may show alert configurations for the items and their corresponding locations in environment 110-1 that are currently being monitored by an inventory removal limits process. This page may allow the user to remove configurations of inventory removal limits that are no longer needed.

Detail Description Paragraph:

[0207] One skilled in the art will appreciate that the pages shown in FIG. 4 and described above are exemplary and not intended to be limiting. Environment 110-1 may implement fewer or additional types of pages that perform various functions that may or may not be associated with the inventory management aspects related to the invention. For example, user interface 210 may include one or more page processes that provide the user with general and/or specific assistance in navigating the pages provided by interface 210. Further, interface 210 may include one or more pages that allow the user to set, view and/or modify various characteristics associated with individual items or item types, such as price, size characteristics, defect status, etc. Additionally, interface 210 may include one or more page processes that allow a user to view customer related information, such as customer profile information that is used with a customer ID card.

Detail Description Paragraph:

[0208] Inventory Management Processes

Detail Description Paragraph:

[0209] As described, environment 110-1 includes an ISSA 200 that performs one or more more intelligent inventory management processes consistent with certain aspects related to the present invention. Each of these inventory management processes may be performed in response to a user accessing ISSA 200 via user interface 210 and/or

in response to a request initiated from a non-user source, such as another task, process, and or computing entity. FIGS. 5-7 show flowcharts of various exemplary inventory processes that may be performed by environment 110-1 consistent with certain aspects related to the present invention.

Detail Description Paragraph:

[0210] FIG. 5 shows an exemplary inventory analysis process that may be performed consistent with certain aspects related to the present invention. Initially, environment 110-1 may perform processes that determine the inventory of items in inventory 170 (Step 510). This step may be initiated by a user, via interface 210 and the pages described with respect to FIG. 4. Alternatively, a process performed by ISSA 200 or a job performed by Jobs 240, may periodically initiate the collection of inventory information. Also, Step 510 may be initiated by an event detected by one or more sensors (e.g., software and/or hardware based sensors) located in environment 110-1. Once environment 110-1 collects the inventory information (e.g., the number of items of each type included in inventory 170), it may be stored in database 215 for subsequent access. Further, the inventory information may be used by ISSA 200 to produce a report and/or content that is provided to a user through various types of medium, such as a printer, web page, telephonic message, etc.

Detail Description Paragraph:

[0211] Environment 110-1 may also determine whether a number of items of any type in inventory 170 is below a predetermined level (Step 520). Environment 110-1 may execute the appropriate processes described above (e.g., via view SKUs out of limits page 418, out of stock control task 231, etc.) to determine and identify an inventory of items of any type has fallen below the predetermined level for that type. If so, (Step 520; YES), an appropriate item below stock level process may be performed (Step 530). This process may include providing an alert message to a user via an output device (e.g., display 204, a pager, cell phone, etc.) indicating which item type needs restocking and the location of the depleted items in environment 110-1. Once the user is notified, he/she may determine whether there are any additional items of the depleted type in an alternate location, such as in a back room. Alternatively, ISSA 200 may indicate to the user whether there is additional inventory of the item type in environment 110-1. Accordingly, the user or ISSA 200 may re-order stock if additional items are needed. Further, step 530 may include providing a customer message on a shelf display located on or near the location where the depleted inventory of items was determined. In one aspect, a store manager or ISSA 200, for example, may formulate customized messages based on the depleted inventory notification that provide various information to a customer that happens to view the shelf display. The customized messages may include offered discounts, rain checks, location information of alternate environments that have the missing items in stock, etc.

Detail Description Paragraph:

[0212] Environment 110-1 may also determine whether there are any misplaced items in inventory 170 (Step 540). Environment 110-1 may execute the appropriate processes described above (e.g., via misplaced SKUs page 422, and out of stock control task 231) to determine and identify any misplaced items in inventory 170. If there is a misplaced item or items (Step 540; YES), environment 110-1 may perform an appropriate misplaced item process (Step 550). This process may include providing a user with information including a location of the missing item and/or its intended location (i.e., where inside a store the item belongs). A user (e.g., stock person) may be directed to the current location of the misplaced item(s) so that they may return these item(s) to their designated location within environment 110-1.

Detail Description Paragraph:

[0213] Also, environment 110-1 may determine information associated with any lost sales based on missing or misplaced items in inventory 170 (Step 550). This step

may include generating and providing a lost sales report (via, for example, out of stock task 231) reflecting revenue that is lost based on the item type being out of stock or having a depleted number of items. Further, an influenced sales report may be generated by ISSA 200 and provided to a user that includes information that correlates various factors (e.g., price of the items, seasonality factors, sales of other items, etc.) to previous and current sales of items of the type that has a depleted inventory. A user may use the influenced sales report to determine whether any adjustments are needed, such as moving the items of the depleted item type to other locations, price, stock order schedules, etc.

Detail Description Paragraph:

[0216] FIG. 7 shows a flowchart of an exemplary recall process consistent with certain aspects related to the present invention. Environment 110-1 may execute the appropriate processes described above (e.g., via rapid recall pages 436-442 and out of rapid recall task 233) to handle any recall events associated with items included in inventory 170. In one aspect, environment 110-1 may determine whether a shelf life or expiration event is detected (Step 710). This step may be associated with determining whether inventory 170 includes any items that have a corresponding shelf life and/or expiration date that has been exceeded and/or is close to being exceed (e.g., within a day, a few days, a week, etc.). If such an event is detected (Step 710; YES), an appropriate shelf life/expiration process is performed (Step 720). This step may include notifying a user (e.g., store employee, clerk at a POS location, manager at a home office, etc.) and/or another software process in ISSA 200 that inventory 170 includes one or more items that have either exceeded or is about to exceed, their shelf life and/or expiration dates. The notification may include information identifying each item (e.g., SKU information), their corresponding locations in environment 110-1, whether there is replaceable stock in environment 110-1 with valid shelf lives and/or expiration dates, and/or instructions on how to deal with the event (e.g., remove from shelves, move item(s) to front of a shelf or store location, etc.). The user and/or ISSA 200 receiving the event may use the received information to execute one or more of the suggested instructions, as well as perform other processes to remedy the shelf life/expiration event. These other duties may include changing the price of one or more of the items that are associated with this event. Further, environment 110-1 may display a message at a POS terminal and/or a display device mounted at or near the items related to this event to warn customers and/or employees that certain items may have exceeded their shelf lives or expiration dates.

Detail Description Paragraph:

[0217] Further, environment 110-1 may determine whether a temperature event has occurred (Step 730). A temperature event may be associated with a condition where the temperature of an area surrounding, at, or near a particular group of items has changed in such a manner as to possibly damage the items in the group. For example, if a refrigeration unit in environment 110-1 has malfunctioned and the temperature drops below a certain value, any produces stored in the unit may be damaged and deemed unhealthy for sale. If a temperature event has occurred (Step 730; YES), a temperature process is performed (Step 740). In one aspect of the invention, the temperature process may include notifying a user of the temperature event, the location in environment 110-1 associated with the event, instructions on how to deal with the event, item information associated with any items included in the area affected by the event (e.g., SKU information), a time period that the event has occurred and/or is occurring, etc. The user may take appropriate actions to ensure any items affected by the event are safe for purchase (e.g., in the event an event just occurred). The user may relocate these items to a properly operating temperature controlled location in environment 110-1 for further purchase. Further, the user, and or ISSA 200 may provide a repair message to a designated user or use location to request repair of the unit that may have malfunctioned causing the temperature event.

Detail Description Paragraph:

[0218] Environment 110-1 may also determine whether any items in inventory 170 are associated with one or more item types that have had a defect reported by a manufacturer (Step 750). This step may include comparing the item information collected from the determined live inventory step 510 shown in FIG. 5 with a received list of defective items provided by the manufacturer. If there are any items of a certain type that matches those found in the defect information provided by the manufacturer, environment 110-1, a defect process may be performed (Step 760). This process may include notifying a user (e.g., customer and/or employee) of the defective items in inventory 170, their location, and information regarding the defect (e.g., the type of defect, whether the item is still safe/operational with the defect, whether the item a POS must be recalled and not sold, etc.). In one aspect, the notified user may be a clerk at location that may facilitate handling the sale of the defective item about to be purchased by a customer. For example, depending on the severity of the defect described in the defect information provided in the notification, the clerk may prevent the customer from purchasing the item. Alternatively, if the item may still be brought up to specification by additional parts or software that will be provided by the manufacturer, the clerk may forward this information to the customer and provide information on how to obtain the corrective parts/software for the purchased item. Further, ISSA 200 may automatically provide a discount for the sale price of the defective item. The reduced sale price may be displayed at the POS location or on a display mounted near a location associated with the one or more defective items. Additionally, environment 110-1 may provide services and/or devices that allow the customer who purchased a defective item to correct the item. For example, a workstation may be provided from which the user may download the necessary software code to correct a defect in a program stored on computer readable medium. Further, environment 110-1 may provide these services to customers in a manner where the customer may leave the purchased item with an employee who performs the necessary procedures to correct the item, such as order a missing part from a manufacturer, downloading a corrective software patch, installing a missing part on a defective item, etc.

Detail Description Paragraph:

[0219] Additionally, environment 110-1 may also determine whether there are any items in inventory 170 that have undergone a design change by their corresponding manufacturer (Step 770). Similarly with Step 750, environment 110-1 may determine whether a design change has occurred by comparing design change information received from a manufacturer with a current list of inventory information, perhaps provided via the process performed at Step 510 of FIG. 5. If an item type has undergone a design change, (Step 770; YES), a design change process may be performed (Step 780). The design change process may include notifying a user (e.g., employee) of the item type that has been changed, the location(s) of any items of the changed type, instructions on how to deal with this design change event, etc. In one aspect of the invention, the design change process may include moving older items to an alternate location in environment 110-1, such as from a back location on a shelf to a front location to promote their sales before the design changed items. Further, the design change process may include removing the older items from inventory 170, which may be at the directions of the manufacturer.

Detail Description Paragraph:

[0222] As described, systems, methods, and articles of manufacture consistent with certain aspects related to the present invention enable an environment to perform item inventory management processes on a real time, or near real-time basis, and at a granularity level that provides many options for the environment to achieve its business goals (e.g., increase sales).

Detail Description Paragraph:

[0224] For instance, one skilled in the art will appreciate the ability to implement the present invention using many different types of environments 110-1. For example, in addition to retail environments, aspects of the present invention may be applied to any environment that includes objects (e.g., physical tangible

objects, such as inventory) that may be RFID tagged and includes antennae for retrieving information from these tags. For instance, the present invention may be applied in an environment where a business wishes to track individuals throughout its business environment. In such a scenario, the business environment (e.g., building) may have antennae mounted in various strategic locations (e.g., doorways, elevators, etc.). Each employee of the business may be issued an RFID card, much like those described previously (e.g., customer RFID card). Thus, ISSA 200 may be able to monitor the movements of a user within the business environment based on information received/collected from the antennae as the employee moves past them.

Detail Description Paragraph:

[0225] Additionally, interface 210 may include other types of interfaces that interact with various processes performed by ISSA 200. For example, various user interfaces may operate that interact with the EPC writer process to allow a user to not only read and write EPC data from/to the RFID tags 280 in inventory 170, but also to monitor the status of such operations. For example, interface 210 may include results interface that presents to a user a results window that includes a list of all items that were entered via an EPC writer window. The results window may include information that indicates whether an EPC write operation was successfully performed. Various interactive display messages may be provided to the user based on the results of any EPC writes. For example, the result window may present one or more error messages indicating a reason why an EPC write was not successful and instructions on how to possibly correct the problem. Also, interface 210 may include a bad tag finder interface that enables a user to request information on any malfunctioning RFID tags 280. The bad tag interface may present to the user information identifying the ID of any bad tags, their location, and the associated item associated with the tag.

Detail Description Table CWU:

2TABLE II Exemplary Software Objects Web IssaServ/Admin.aspx Handles all administrative re- Service related functions Methods GetEPCReadersListXML Retrieves selected Req. Broker's list of zones GetUserListXML Retrieves list of users StartRequestBroker Tell Broker Mgr to START selected Req Broker GetRequestBrokerDetailXML Retrieves selected Req Broker's info SaveRequestBroker Saves Req Broker's data GetReguestBrokerListXML Retrieves list of Req Brokers SaveEPCReader Saves the zone's data StopRequestBroker Tell Broker Mgr to STOP selected Req Broker StartAllRequestBrokers Tell Broker Mgr to START all Req Brokers GetEPCReaderDetailsXML Retrieves selected zone's info SaveUser Saves the user's data DemoGetZonesInvListXML Retrieves list of items on selected list of readers StopAllRequestBrokers Tell Broker Mgr to STOP ALL Req Brokers GetRequestBrokerStatus Retrieves the current status of a Req Broker GetUserDetailXML Retrieves selected user's info. Web IssaServ/Inventory.aspx Handles all inventory related Service functions. Method GetItemDetail returns item detail for a given SKU including product information, EPCs and locations. Web IssaServ/OutOfStock.aspx Interface for client application Service for executing all business logic functions related to out of stock functionality. Methods GetInventoryXML Returns XML Stream of physical inventory. Data are retrieved from tblInv. OutOfLimitSKUXML Returns XML Stream of all SKUs over or under a baseline inventory. MisplacedSKUXML Returns XML stream of all SKUs that are currently misplaced on shelves. SKUArrangement Returns XML stream of SKUs and their currently acceptable locations. SetShelfArrangement Sets the current shelf arrangement, and optionally sets the baseline inventory. Web IssaServ/ Initiated from Inventory Read Service InventoryRequest.aspx Request Interface. Executed when EPC codes are sent from Response Broker. Method ReadEPC Updates tblCurEPC, and tblRemEPC Web IssaServ/Shrinkage.aspx Handles all product shrinkage Service related processes. Methods MajorPullXML Returns XML Stream of SKUs or a SKU that has been pulled from location(s) in a specified amount of time based on a specified quantity. InventoryCompareXML Compares tblInv and tblERPInv and returns XML Stream of SKUs and locations where inventory variance is greater or less than a given value. Web IssaServ/Login.aspx Handles all user related Service functions. Method Login

Validates a given user name and password. Web IssaServ/RapidRecall.aspx Used for RapidRecall related Service processes. Methods ExpiredProductsXML Returns XML Stream of all products that have been expired based on an expiration date in the tblSKU table. Web IssaServ/Alerts.aspx Used for all alert related Service functions. Methods GetInventoryAlertJobs Retrieve current inventory alert configuration info. GetCurrentAlertsXML Returns an XML Stream of all the current alerts in the system. RemoveAlerts Remove specified alerts from database NewInventoryAlertJob Sets an alert job to monitor products in a given location that go above or below a given percentage of their baseline inventory ConfirmAlerts Update selected list of alerts to show confirmation NewInventoryRemovalJob Sets an alert job to monitor products have been removed in a given quantity in a given amount of seconds. Web IssaServ/LookupLists.aspx Handles all drop-down list Service population functions. Method GetLists Returns items to populate give drop-down list.

Detail Description Table CWU:

5TABLE V Search Fields Manufacturer SKU Number Category Current Inventory Count (From, To) (on-shelf) Current Inventory Count (From, To) (back room or warehouse) Expected Inventory Count (From, To) on order Expected Delivery Date Serial Number (From, To) Price (From, To) Cost (From, To) Aisle Number Gondola Number Shelf Number EPC Reader (For debugging purposes) Revenue (price .times. velocity) Time an Alert is active Time elapsed since last sale Time elapsed since item count dropped, below a critical threshold Time since an out-of-date, or until an out-of-date Other arbitrarily assigned or calculated priority codes

CLAIMS:

1. A method for managing an inventory of items, each item being positioned in a respective location within an environment and being associated with a corresponding wireless identification device, the method comprising: providing item information associated with each item to each corresponding wireless identification device; and performing an inventory management process based on the item information to provide real time information associated with the inventory of items, the inventory management process including at least one of: an out of stock control process; a shrinkage recognition process, a rapid product recall process, an alert monitor process, and a sales optimization process.

2. The method of claim 1, wherein the inventory of items includes items of one or more types and the out of stock control process includes at least one of: (i) determining a current inventory count of the items of any type located in the environment based on information retrieved from one or more of the wireless identification devices, (ii) determining whether any items of any type are misplaced within the environment based on information retrieved from one or more of the wireless identification devices; (iii) determining when a number of items of any type in the inventory falls below a first threshold value based on information retrieved from one or more of the wireless identification devices; (iii) determining a loss value reflecting an amount of lost revenue based on a condition where items of a certain type are no longer included in the inventory of items, (iv) determining one or more factors that influence previous sales of each type of item included in the inventory of items, (v) determining an alternate location within the environment to position items of a certain type that have a history of sales below a second threshold value, (vi) determining an alternate location outside the environment to position items of a certain type that have been located in their respective locations within the environment for more than a predetermined amount of time, (vii) providing an out of stock message to a display device when items of a certain type are no longer located in their respective locations, and (viii) determining an inventory characteristic associated with each type of item.

3. The method of claim 2, wherein determining a current inventory count includes: retrieving item information from one or more wireless identification devices corresponding to one or more items; and determining a count of each item of one or

more types based on the retrieved item information.

4. The method of claim 2, wherein determining a current inventory count includes: retrieving the item information associated with each item from a database; and determining a count of each item of each type based on the retrieved item information, wherein the database periodically receives the item information from a process that collects the item information from each wireless identification device.

10. The method of claim 3, wherein determining when a count of any type of item falls below a first threshold value includes: identifying any types of items that have a number of items located within the environment below the first threshold value based on the determined inventory count; and prioritizing the item types based on one of: a determined lost profit value based on the respective item type having a number of items below the first threshold value, whether additional items of the respective item type are available in another location within the environment, and whether a reason for the item type has fallen below the first threshold value is based on short-term demand for the item type.

11. The method of claim 2, wherein determining a loss value includes: for each type of item that is no longer located in the environment, determining an amount of revenue that was generated by previous sales of items of the respective type over a previous time period; and determining the loss value for the type of item no longer located in the environment based on the determined generated revenue.

12. The method of claim 2, wherein determining one or more factors that influence previous sales of each type of item includes: identifying one or more external factors that were present during a time period that the previous sales of each type of item occurred; and comparing the identified one or more external factors with the previous sales to determine how each of the external factors influenced the previous sales.

13. The method of claim 12, wherein the one or more external factors includes at least one of pricing of the items of each type, seasonality factors, and concurrent sales of other types of items.

15. The method of claim 2, wherein determining an alternate location within the environment includes: determining whether a specified type of item has a history of sales below the second threshold value in the environment; and determining an alternate location within the environment to reposition items of the specified item type included in the inventory based on a history of sales of items associated with the alternate location.

16. The method of claim 15, wherein the history of sales associated with the alternate location includes a history of sales of a different type of item located in the alternate location.

17. The method of claim 2, wherein determining an alternate location outside the environment includes: determining whether a type of item has a history of sales below the second threshold value; and determining an alternate location outside the environment to reposition the items of the item type based on a history of sales associated with other items of the same item type that were positioned at the alternate location.

18. The method of claim 17, wherein providing an out of stock message includes: determining whether items of the certain type are no longer located in their respective locations based on the inventory count; and generating the out of stock message that includes at least one of an indication that the item type is out of stock, an offer for a discounted sale price on an item of the certain item type, a rain check for an item of the certain type, and an indication of an alternate

location outside the environment where an item of the certain type may be located.

20. The method of claim 2, wherein the inventory characteristic is a mathematical relationship between previous sales of a type of item over a predetermined time period.

21. The method of claim 20, wherein the relationship represents whether the previous sales of the type of item have been sporadic or uniform over the predetermined time period.

33. The method of claim 28, further including: providing an indication reflecting that the item should be moved from the inventory of items when the item is being purchased at a point of sale terminal.

34. The method of claim 33, wherein the indication includes a message displayed at the point of sale terminal that the item has exceeded its shelf life.

39. The method of claim 1, wherein the inventory of items includes items of one or more types and the sales optimization process includes at least one of: determining a number of times one or more items of a particular type are moved from, and positioned back, into their respective location; determining a number of times an item of any type is purchased with an item of another type; determining a number of times an item of any type is purchased with one or more items of the same type; determining any items of type that have not moved from their respective location for a predetermined period of time; and determining any type of item that includes items that have a sale price change with a determined previous period of time.

40. The method of claim 39, wherein determining a number of times one or more items of one or more types are moved from and positioned back into their respective locations includes: for each type of item: periodically performing an inventory count of each item to determine whether any items have been removed from their respective locations.

43. A system for providing intelligent inventory management information associated with an item included in an inventory of items that each include an RFID tag that includes item information associated with the corresponding item, the system comprising: a memory device including a data structure comprising: a universal price code associated with the item, an electronic pricing code associated with the item, price information associated with the item, seasonality information reflecting a seasonal characteristic associated with the item, a shelf life indicator associated with the item, historical sale information reflecting previous sales associated with one or more other items similar to the item, out of stock information reflecting conditions when the location includes a number of items similar to the item located below a predetermined threshold value, historical information reflecting a number of times the item is removed and returned to the location, shelf volume size information reflecting a physical size of the item in relation to the location, first location information reflecting a physical location of the item, second location information reflecting a preferable physical location of the item, shrinkage information associated with the item and the other similar items, cost information associated with the item, timestamp information reflecting a time when the item was placed in the location, expiration date information reflecting a date when the item should be removed from the location, sale information reflecting a date and time of an item similar to the item was sold and a sale price of the sold item, and a customer number associated with an individual that purchased the sold item; and a processor for accessing the memory device to perform an inventory management process associated with the item.

44. A method of providing inventory information in an environment including an inventory of items each positioned within a respective location within an environment and is associated with a corresponding wireless identification device,

and an inventory monitoring process that periodically performs an inventory count of the items in the environment by retrieving item information from each wireless identification device associated with each item and storing the retrieved information in a database, the method comprising: receiving from a user a request for an availability of an item within the environment; searching the item information within the database to determine whether the requested item is available in the environment; and providing an indication reflecting a result of the search.

53. The method of claim 44, wherein the indication includes at least one of an indication that the item is available in the environment, an indication that the item is not available in the environment, an offer for a discount on a sale price of the item, an offer for a discount on a sale price of an alternative item, and an indication reflecting one or more alternative environments that the item is available.

56. The method of claim 55, wherein the message includes at least one of an indication that the item is not available in the environment, an offer for a discount on a sale price of the item, an indication reflecting one or more alternative environments that the item is available, and directions to the one or more alternative environments.

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57. A method for providing inventory management for an inventory of items that are each tagged with an RFID tag that includes item information identifying each respective item and at least one item characteristic, the method comprising: storing an electronic document received from a customer including a list of one or more desired items the customer is interested in purchasing in the environment; determining the presence of the customer within the environment; determining whether the customer is located in proximity to a location in the environment that includes a first item that is included in the list of one or more desired items based on the stored electronic document; and presenting on a display device positioned at or near the location, item information associated with the first item based on the determination.

60. A system for managing an inventory of items, each item being positioned in a respective location within an environment and being associated with a corresponding wireless identification device, the system comprising: means for providing item information associated with each item to each corresponding wireless identification device; and means for performing an inventory management process based on the item information to provide real time information associated with the inventory of items, the means for performing the inventory management process including at least one of: means for performing an out of stock control process; means for performing a shrinkage recognition process, means for performing a rapid product recall process, means for performing an alert monitor process, and means for performing a sales optimization process.

61. The system of claim 60, wherein the inventory of items includes items of one or more types and the means for performing the out of stock control process includes at least one of: (i) means for determining a current inventory count of the items of any type located in the environment based on information retrieved from one or more of the wireless identification devices, (ii) means for determining whether any items of any type are misplaced within the environment based on information retrieved from one or more of the wireless identification devices, (iii) means for determining when a number of items of any type in the inventory falls below a first threshold value based on information retrieved from one or more of the wireless identification devices, (iii) means for determining a loss value reflecting an amount of lost revenue based on a condition where items of a certain type are no longer included in the inventory of items, (iv) means for determining one or more factors that influence previous sales of each type of item included in the inventory of items, (v) means for determining an alternate location within the

environment to position items of a certain type that have a history of sales below a second threshold value, (vi) means for determining an alternate location outside the environment to position items of a certain type that have been located in their respective locations within the environment for more than a predetermined amount of time, (vii) means for providing an out of stock message to a display device when items of a certain type are no longer located in their respective locations, and (viii) means for determining an inventory characteristic associated with each type of item.

62. The system of claim 61, wherein the means for determining a current inventory count includes: means for retrieving item information from one or more wireless identification devices corresponding to one or more items; and means for determining a count of each item of one or more types based on the retrieved item information.

63. The system of claim 61, wherein the means for determining a current inventory count includes: means for retrieving the item information associated with each item from a database; and means for determining a count of each item of each type based on the retrieved item information, wherein the database periodically receives the item information from a process that collects the item information from each wireless identification device.

69. The system of claim 63, wherein the means for determining when a count of any type of item falls below a first threshold value includes: means for identifying any types of items that have a number of items located within the environment below the first threshold value based on the determined inventory count; and means for prioritizing the item types based on one of: a determined lost profit value based on the respective item type having a number of items below the first threshold value, whether additional items of the respective item type are available in another location within the environment, and whether a reason for the item type has fallen below the first threshold value is based on short-term demand for the item type.

70. The system of claim 61, wherein the means for determining a loss value includes: means for determining, for each type of item that is no longer located in the environment, an amount of revenue that was generated by previous sales of items of the respective type over a previous time period; and means for determining, for each type of item that is no longer located in the environment, the loss value for the type of item no longer located in the environment based on the determined generated revenue.

71. The system of claim 61, wherein the means for determining one or more factors that influence previous sales of each type of item includes: means for identifying one or more external factors that were present during a time period that the previous sales of each type of item occurred; and means for comparing the identified one or more external factors with the previous sales to determine how each of the external factors influenced the previous sales.

72. The system of claim 71, wherein the one or more external factors includes at least one of pricing of the items of each type, seasonality factors, and concurrent sales of other types of items.

74. The system of claim 61, wherein the means for determining an alternate location within the environment includes: means for determining whether a specified type of item has a history of sales below the second threshold value in the environment; and means for determining an alternate location within the environment to reposition items of the specified item type included in the inventory based on a history of sales of items associated with the alternate location.

75. The system of claim 74, wherein the history of sales associated with the

alternate location includes a history of sales of a different type of item located in the alternate location.

76. The system of claim 61, wherein the means for determining an alternate location outside the environment includes: means for determining whether a type of item has a history of sales below the second threshold value; and means for determining an alternate location outside the environment to reposition the items of the item type based on a history of sales associated with other items of the same item type that were positioned at the alternate location.

77. The system of claim 76, wherein the means for providing an out of stock message includes: means for determining whether items of the certain type are no longer located in their respective locations based on the inventory count; and means for generating the out of stock message that includes at least one of an indication that the item type is out of stock, an offer for a discounted sale price on an item of the certain item type, a rain check for an item of the certain type, and an indication of an alternate location outside the environment where an item of the certain type may be located.

79. The system of claim 61, wherein the inventory characteristic is a mathematical relationship between previous sales of a type of item over a predetermined time period.

80. The system of claim 79, wherein the relationship represents whether the previous sales of the type of item have been sporadic or uniform over the predetermined time period.

92. The system of claim 87, further including: means for providing an indication reflecting that the item should be moved from the inventory of items when the item is being purchased at a point of sale terminal.

93. The system of claim 92, wherein the indication includes a message displayed at the point of sale terminal that the item has exceeded its shelf life.

98. The system of claim 60, wherein the inventory of items includes items of one or more types and the means for performing the sales optimization process includes at least one of: means for determining a number of times one or more items of a particular type are moved from, and positioned back, into their respective location; means for determining a number of times an item of any type is purchased with an item of another type; means for determining a number of times an item of any type is purchased with one or more items of the same type; means for determining items of any type items that have not moved from their respective location for a predetermined period of time; and means for determining any type of item that includes items that have a sale price change with a determined previous period of time.

99. The system of claim 98, wherein the means for determining a number of times one or more items of one or more types are moved from and positioned back into their respective locations includes: means for periodically performing, for each type of item, an inventory count of each item to determine whether any items have been removed from their respective locations.

102. A system for providing inventory information in an environment including an inventory of items each positioned within a respective location within an environment and is associated with a corresponding wireless identification device, and an inventory monitoring process that periodically performs an inventory count of the items in the environment by retrieving item information from each wireless identification device associated with each item and storing the retrieved information in a database, the system comprising: means for receiving from a user a request for an availability of an item within the environment; means for searching

the item information within the database to determine whether the requested item is available in the environment; and means for providing an indication reflecting a result of the search.

111. The system of claim 104, wherein the indication includes at least one of an indication that the item is available in the environment, an indication that the item is not available in the environment, an offer for a discount on a sale price of the item, an offer for a discount on a sale price of an alternative item, and an indication reflecting one or more alternative environments that the item is available.

114. The system of claim 113, wherein the message includes at least one of an indication that the item is not available in the environment, an offer for a discount on a sale price of the item, an indication reflecting one or more alternative environments that the item is available, and a directions to the one or more alternative environments.

115. A system for providing inventory management for an inventory of items that are each tagged with an RFID tag that includes item information identifying each respective item and at least one item characteristic, the system comprising: means for storing an electronic document received from a customer including a list of one or more desired items the customer is interested in purchasing in the environment; means for determining the presence of the customer within the environment; means for determining whether the customer is located in proximity to a location in the environment that includes a first item that is included in the list of one or more desired items based on the stored electronic document; and means for presenting on a display device positioned at or near the location, item information associated with the first item based on the determination.

118. A computer-readable medium including instructions for performing a method, when executed by a processor, for managing an inventory of items, each item being positioned in a respective location within an environment and being associated with a corresponding wireless identification device, the method comprising: providing item information associated with each item to each corresponding wireless identification device; and performing an inventory management process based on the item information to provide real-time information associated with the inventory of items, the inventory management process including at least one of: an out of stock control process; a shrinkage recognition process, a rapid-product recall process, an alert monitor process, and a sales optimization process.

119. The computer-readable medium of claim 118, wherein the inventory of items includes items of one or more types and the out of stock control process includes at least one of: (i) determining a current inventory count of the items of any type located in the environment based on information retrieved from one or more of the wireless identification devices, (ii) determining whether any items of any type are misplaced within the environment based on information retrieved from one or more of the wireless identification devices, (iii) determining when a number of items of any type in the inventory falls below a first threshold value based on information retrieved from one or more of the wireless identification devices, (iii) determining a loss value reflecting an amount of lost revenue based on a condition where items of a certain type are no longer included in the inventory of items, (iv) determining one or more factors that influence previous sales of each type of item included in the inventory of items, (v) determining an alternate location within the environment to position items of a certain type that have a history of sales below a second threshold value, (vi) determining an alternate location outside the environment to position items of a certain type that have been located in their respective locations within the environment for more than a predetermined amount of time, (vii) providing an out of stock message to a display device when items of a certain type are no longer located in their respective locations, and (viii) determining an inventory characteristic associated with each type of item.

120. The computer-readable medium of claim 119, wherein determining a current inventory count includes: retrieving item information from one or more wireless identification devices corresponding to one or more items; and determining a count of each item of one or more types based on the retrieved item information.

121. The computer-readable medium of claim 119, wherein determining a current inventory count includes: retrieving the item information associated with each item from a database; and determining a count of each item of each type based on the retrieved item information, wherein the database periodically receives the item information from a process that collects the item information from each wireless identification device.

127. The computer-readable medium of claim 120, wherein determining when a count of any type of item falls below a first threshold value includes: identifying any types of items that have a number of items located within the environment below the first threshold value based on the determined inventory count; and prioritizing the item types based on one of: a determined lost profit value based on the respective item type having a number of items below the first threshold value, whether additional items of the respective item type are available in another location within the environment, and whether a reason that the item type has fallen below the first threshold value is based on short-term demand for the item type.

128. The computer-readable medium of claim 119, wherein determining a loss value includes: for each type of item that is no longer located in the environment, determining an amount of revenue that was generated by previous sales of items of the respective type over a previous time period; and determining the loss value for the type of item no longer located in the environment based on the determined generated revenue.

129. The computer-readable medium of claim 119, wherein determining one or more factors that influence previous sales of each type of item includes: identifying one or more external factors that were present during a time period that the previous sales of each type of item occurred; and comparing the identified one or more external factors with the previous sales to determine how each of the external factors influenced the previous sales.

130. The computer-readable medium of claim 129, wherein the one or more external factors includes at least one of pricing of the items of each type, seasonality factors, and concurrent sales of other types of items.

132. The computer-readable medium of claim 119, wherein determining an alternate location within the environment includes: determining whether a specified type of item has a history of sales below the second threshold value in the environment; and determining an alternate location within the environment to reposition items of the specified item type included in the inventory based on a history of sales of items associated with the alternate location.

133. The computer-readable medium of claim 132, wherein the history of sales associated with the alternate location includes a history of sales of a different type of item located in the alternate location.

134. The computer-readable medium of claim 119, wherein determining an alternate location outside the environment includes: determining whether a type of item has a history of sales below the second threshold value; and determining an alternate location outside the environment to reposition the items of the item type based on a history of sales associated with other items of the same item type that were positioned at the alternate location.

135. The computer-readable medium of claim 134, wherein providing an out of stock

message includes: determining whether items of the certain type are no longer located in their respective locations based on the inventory count; and generating the out of stock message that includes at least one of an indication that the item type is out of stock, an offer for a discounted sale price on an item of the certain item type, a rain check for an item of the certain type, and an indication of an alternate location outside the environment where an item of the certain type may be located.

137. The computer-readable medium of claim 119, wherein the inventory characteristic is a mathematical relationship between previous sales of a type of item over a predetermined time period.

138. The computer-readable medium of claim 137, wherein the relationship represents whether the previous sales of the type of item have been sporadic or uniform over the predetermined time period.

150. The computer-readable medium of claim 145, wherein the method further includes: providing an indication reflecting that the item should be moved from the inventory of items when the item is being purchased at a point of sale terminal.

151. The computer-readable medium of claim 150, wherein the indication includes a message displayed at the point of sale terminal that the item has exceeded its shelf life.

156. The computer-readable medium of claim 118, wherein the inventory of items includes items of one or more types and the sales optimization process includes at least one of: determining a number of times one or more items of a particular type are moved from, and positioned back, into their respective location; determining a number of times an item of any type is purchased with an item of another type; determining a number of times an item of any type is purchased with one or more items of the same type; determining items of any type that have not moved from their respective location for a predetermined period of time; and determining any type of item that includes items that have a sale price change with a determined previous period of time.

157. The computer-readable medium of claim 156, wherein determining a number of times one or more items of one or more types are moved from and positioned back into their respective locations includes: for each type of item, periodically performing an inventory count of each item to determine whether any items have been removed from their respective locations.

160. A computer-readable medium including instructions for performing a method, when executed by a processor, for providing inventory information in an environment including an inventory of items each positioned within a respective location within an environment and is associated with a corresponding wireless identification device, and an inventory monitoring process that periodically performs an inventory count of the items in the environment by retrieving item information from each wireless identification device associated with each item and storing the retrieved information in a database, the method comprising: receiving from a user a request for an availability of an item within the environment; searching the item information within the database to determine whether the requested item is available in the environment; and providing an indication reflecting a result of the search.

169. The computer-readable medium of claim 160, wherein the indication includes at least one of an indication that the item is available in the environment, an indication that the item is not available in the environment, an offer for a discount on a sale price of the item, an offer for a discount on a sale price of an alternative item, and an indication reflecting one or more alternative environments that the item is available.

172. The computer-readable medium of claim 171, wherein the message includes at least one of an indication that the item is not available in the environment, an offer for a discount on a sale price of the item, an indication reflecting one or more alternative environments that the item is available, and directions to the one or more alternative environments.

173. A computer-readable medium including instructions for performing a method, when executed by a processor, for providing inventory management for an inventory of items that are each tagged with an RFID tag that includes item information identifying each respective item and at least one item characteristic, the method comprising: storing an electronic document received from a customer including a list of one or more desired items the customer is interested in purchasing in the environment; determining the presence of the customer within the environment; determining whether the customer is located in proximity to a location in the environment that includes a first item that is included in the list of one or more desired items based on the stored electronic document; and presenting on a display device positioned at or near the location, item information associated with the first item based on the determination.

176. A system for managing an inventory of items of one or more item types, each item being positioned in a respective location within an environment and is associated with a corresponding wireless identification device that includes item information related to the respective item, the system comprising: a data collection system configured to retrieve the item information from one or more of the wireless identification devices in response to one or more read commands; and an intelligent inventory management system configured to generate the one or more read commands and receive the retrieved item information from the data collection system, the intelligent inventory management system comprising: a database that stores the received item information and characteristic information associated with each of the items; and at least one of stock control means for determining at least one of a current inventory count of items of any type based on the received item information, any items that are misplaced in the environment, items of any type that are approaching or have reached an out of stock condition, "an alternate" location within the environment to position items of any type that have a history of sales below a threshold value, shrinkage recognition means for determining when a number of items of a certain type positioned in a first location is reduced by a determined value within a set time period, rapid recall means for determining whether an item needs to be moved from its current location based on at least one of a temporal, a defect, and a temperature characteristic associated with the item, and alert monitoring means for generating and providing one or more indications based on at least one of an out of stock condition for an item type, a misplaced item condition for an item, and a malfunction condition.

183. The system of claim 176, wherein the system includes a Point Of Sale (POS) terminal and the rapid recall means also generates an alarm message at the POS terminal when the customer attempts to purchase an item that (i) has exceeded at least one of an expiration date and a shelf life, or (ii) is defective.

184. An environment including items each tagged with a wireless identification device and positioned in a designated location, the environment comprising: a database including information associated with each of the items; storage units each including at least one antenna and having a support means that supports one or more of the items; a computer system for providing commands to retrieve item information from the wireless identification devices and storing the item information in the database; a data collection system for activating a corresponding antenna within a particular storage unit, retrieving item information from an item supported by a support means in the particular storage unit, and providing the item information to the computer system, wherein the computer system includes a user interface that allows a user to request and receive real time

inventory information associated with one or more of the items in the environment based on the item information stored in the database.

185. The environment of claim 184, wherein the computer system provides the user, based on a corresponding user request, at least one of: a current inventory count of one or more types of items in the environment, a location of an item that is misplaced in the environment, an alternate location in the environment to move an item that has a history of sales below a predetermined threshold value, an alternate location in the environment to move an item of a certain type that has been redesigned by a manufacturer, and a location of any item of interest.

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Generate Collection

L8: Entry 44 of 57

File: PGPB

Mar 28, 2002

DOCUMENT-IDENTIFIER: US 20020038267 A1

TITLE: System and method for using radio frequency identification in retail operations

Abstract Paragraph:

A system and method for conveniently tracking inventory and merchandise in a retail setting is disclosed. The system can track various items as they travel through the entire supply chain. The system includes provisions that provide accurate and real time information related to available inventory on retail floor space and in storage. The system can be used to automatically determine available inventory and the system can be used to assist customers and staff in locating particular items.

Summary of Invention Paragraph:

[0008] Currently, RFID technology is used to tag pallets or cartons; vehicles; company assets; items such as apparel, luggage and laundry; people, livestock or pets; and high-value electronics such as computers and TVs. Current applications for RFID technology include security access; loss prevention; asset and inventory tracking; automatic toll collection; wildlife and livestock tracking; house arrest monitoring systems; manufacturing work in process data; shipping and intermodal containers and air cargo tracking; trailer maintenance; and railroad car tracking.

Summary of Invention Paragraph:

[0012] In accordance with the system and method of the present invention, an RFID tag is associated with each item (or carton or person) to be tracked. In a retail organization that sells ready-to-wear garments, for example, an RFID tag is associated with each ready-to-wear garment. The tag may be sewn into the garment and/or placed into a tag that is attached after the garment is manufactured.

Summary of Invention Paragraph:

[0015] The system also includes at least one and typically a plurality of host computers for receiving and processing information from the tag readers and interfacing with other inventory, operations and logistics systems. If the tag readers are designed to provide information in digital form, then the host computer(s) receive and process the information in this form. Naturally, the conversion to digital form could take place in the host computer, if desired.

Summary of Invention Paragraph:

[0016] The use of RFID technology yields savings throughout the retail supply chain, including increased recovery of vendor quality chargebacks; a reduction of freight loss; increased accuracy of store receiving; increased data integrity of store inventory management; a reduction of store backroom lost sales; increased efficiency and effectiveness of store loss prevention activities; increased data integrity of merchandise returns; enhanced vendor shortship visibility; improved distribution center picking/stocking labor efficiency, and improved distribution center inventory accuracy. The use of RFID technology also makes it possible to improve loss prevention procedures at each step in the supply chain.

Summary of Invention Paragraph:

[0018] Vendor Quality Chargebacks/Inventory Accuracy

Summary of Invention Paragraph:

[0023] In this area a portion of the potential savings comes from reducing labor costs incurred during the receiving process. However, the largest percentage of the benefits comes from recouping lost margin dollars resulting from inaccurate receiving data. Store inventory management RFID technology can be applied to facilitate inventory physical counts at the stores. A Retailer (e.g., ready-to-wear retailer) currently spends money either directly or by hiring 3.sup.rd party companies to come into stores and perform physical counts. This annual cost increases as the Retailer expands its store base.

Summary of Invention Paragraph:

[0024] Furthermore, field staff time spent on taking regular and ad hoc physical counts can be reduced significantly or eliminated through RFID. A benefit that is difficult to quantify is the ability of merchandise planning and distribution groups to make better decisions because they would base their decisions on more accurate inventory data. In addition, loss prevention is improved because it is possible to track products.

Summary of Invention Paragraph:

[0026] RFID technology can potentially replace sensor tag technology in the stores to prevent both customer theft and employee theft. One example of a sensor tag that is used to assist with inventory control is a SENSORMATIC tag. The sensor tag solution is expensive for two reasons: the cost of the sensor tags and the store labor required to affix the tags. If RFID tags are embedded or affixed at the manufacturer, the cost of the sensor tags and the associated store labor costs are eliminated. Another problem with sensor tags is the difficulty of removing those tags after the item has been purchased. In some instances, salespersons inadvertently forget to remove sensor tags after an item has been purchased. Consumers who have purchased items with sensor tags that have not been removed experience considerable difficulty in removing those tags themselves. Occasionally, the process of removing the sensor tag damages or destroys the item attached to the tag. Customer could also return the item to the store to have a salesperson remove the sensor tag, but that is generally inconvenient. Use of RFID tags would eliminate this difficult and hazardous removal process and would also eliminate the need for customers to return items for sensor tag removal.

Summary of Invention Paragraph:

[0027] In addition, RFID technology is especially useful in preventing employee theft since it is possible to maintain records as to the identity of a person deactivating or flagging an RFID tag. If a tag is deactivated or flagged and the product is later determined to be missing, i.e., not sold or not in inventory, the identity of the person that deactivated or flagged the tag can be useful in preventing loss.

Summary of Invention Paragraph:

[0028] Point-of-Sale Data Integrity

Summary of Invention Paragraph:

[0029] This type of data integrity occurs when a store associate keys in an undeterminable number because the item SKU cannot be identified. When this occurs, on-hand inventory is not decremented resulting in poor data integrity and sales loss. RFID technology can mitigate this problem by having the item identified by the RFID chip, which can be read by an interrogator connected to or a part of the point-of-sale system.

Summary of Invention Paragraph:

[0031] When merchandise is not on the sales floor, but sitting in the backroom, there is a potential for lost sales. One potential remedy for this issue is to reduce the backroom space to force the backstock on to the sales floor. Another

remedy would be to use RFID technology to scan the backroom whenever an item is not in stock on the sales floor. If the item is in the backroom, it will be located through RFID, retrieved and moved to the sales floor or provided to the customer. This process could be automated by running periodic comparisons of inventory data reflecting products on the sales floor and data reflecting products in storage.

Summary of Invention Paragraph:

[0032] Merchandise Returns Data Integrity Problems

Summary of Invention Paragraph:

[0033] This type of data integrity problem results from sales associates incorrectly keying in the style number of returned merchandise without a ticket or a receipt. Again, this problem can be addressed by the RFID chip, which can be read by an interrogator connected to or a part of the point-of-sale system.

Summary of Invention Paragraph:

[0035] Currently, Retailers do not have visibility to their goods at the SKU level as they leave the factory. RFID technology embedded in the clothing combined with appropriately placed RFID interrogators will give the Retailer (e.g., ready-to-wear retailer) visibility at the unit level to what each vendor is delivering. This application of RFID results in more accurate inventory control and payment on goods actually received.

Summary of Invention Paragraph:

[0038] Inventory and Accuracy

Summary of Invention Paragraph:

[0039] Annual labor savings by eliminating or reducing inventory adjustments and automating picking accuracy audits are significant. While RFID would reduce the cost associated with accuracy, it would also increase the amount of cartons verified from random sampling to 100%.

Summary of Invention Paragraph:

[0041] RFID technology can be used to track the fitting room traffic. To facilitate this feature, antennas are placed at the entrance of fitting rooms to read the tags of garments that are brought into the fitting room. Data concerning the identity of products taken into the fitting rooms is gathered as indicia of consumer interest in the garment. The system preferably includes software for correlating the fitting room data with other data, such as sales data or shelf location data, to provide business information and market research tools by, for example, identifying products that are frequently tried on, but seldom purchased, or showing the relationship between the frequency with which a garment is tried on and the garment's location within the store.

Detail Description Paragraph:

[0057] The RFID tag may be attached to the units at origin. As the units pass interrogators installed in appropriate locations within the retail industry supply chain, RFID technology, when fully developed, can provide SKU level visibility to inventory as it moves through every process. Moreover, RFID offers read/write capability so users can add data to the tags as they pass by an interrogator, enabling functions like time stamping. RFID does not depend on orientation or line-of-sight; in other words RFID tags can be read through a carton. In addition, RFID can identify multiple articles simultaneously.

Detail Description Paragraph:

[0062] The present invention relates to use of RFID technology that provides advantages in each stage of the supply chain of a retail organization. Again, the example of a supply chain is shown in connection with FIG. 2. For purposes of this description, it will be assumed that the RFID technology is employed in a retail organization that sells ready-to-wear garments and other items, keeping in mind

that the present invention can be applied to any supply chain regardless of the kind of goods or services. In a preferred embodiment, an RFID tag is associated with each ready-to-wear garment or other item. The tag may be sewn into the garment and/or attached after the garment is manufactured.

Detail Description Paragraph:

[0071] To implement this feature in a distribution center requires tag readers or tunnels equipped with tag readers in the distribution center multifunction area, as well as software interfaces with the overall inventory management systems.

Detail Description Paragraph:

[0075] In addition, it is possible to write information directly onto the tag at the unit level. Readers can be provided in the chutes to verify contents and order completion or, alternatively, one fixed scan of carton contents through a tunnel can be used. In this way, the sortation and allocation of orders can be verified in a highly automated process. This arrangement provides numerous benefits, including eliminating inventory adjustments, increased accuracy and increased and improved utilization of capital. The system can also provide significant increases in productivity.

Detail Description Paragraph:

[0077] In addition, by providing distribution center associates with tag readers and making appropriate system enhancements, the RFID technology can be used in connection with inventory control and quality assurance. For instance, the RFID technology can be used to decrease time associated with cycle counts and inventory audits. Moreover, the use of RFID technology eliminates the need to open cartons to determine contents and count (this increases picker accuracy as mentioned). In addition, the system reduces labor associated with searching for a product (exception mode) and reduces labor associated with mixes and wrong content of cartons outside of receiving.

Detail Description Paragraph:

[0079] By providing tags and a yard antenna system, it is also possible to implement a yard management system using active tags and appropriate equipment. This, for example, could be used to identify when a truck is on premises, where it is parked and what inventory is on the truck. This system should be designed to interface with the Scan and warehouse management (WMS and TMS) systems.

Detail Description Paragraph:

[0081] Bins 410 containing merchandise or items that include RFID tags can be moved across Sensing Portion 406 by using the Rolling Table 404. This permits the items of merchandise contained within Bin 410 to pass within an appropriate distance that permits the RFID readers disposed in Sensing Portion 406 to interrogate the RFID tags associated with the merchandise Bin 410. The RFID readers and Sensing Portion 406 are in communication with a Computer 412. As the readers interrogate the RFID tags, information is transmitted to Computer 412. In this way, as merchandise is moved down a conventional Rolling Table 404, inaccurate assessment of the merchandise can be collected by Computer 412.

Detail Description Paragraph:

[0082] There are many uses for the Portable Dock Loader 402. Portable Dock Loader 402 can be used to verify that certain cartons have been placed within a trailer or have been shifted. Portable Dock Loader 402 can also be used at the receiving end to verify that certain shipping cartons, bins or merchandise have been received by the retail store or the next entity in the supply chain.

Detail Description Paragraph:

[0086] RFID technology can also be used at the third party distribution (pooler) stage of the ready-to-wear retailer supply chain. In particular, the RFID technology can be used to track pooler receipts at the unit level. This will

support freight claims, decrease outbound lost freight, provide visibility to stores of forthcoming shipments, facilitate value added services ability and provide visibility to stores turning away product. To implement this system, it is necessary to provide RFID tag readers at the pooler sites and software at the pooler sites to interface data collected with inventory systems.

Detail Description Paragraph:

[0087] The present invention further contemplates wide use of RFID technology in retail stores, the final stage of the ready-to-wear retailer supply chain. To begin with, RFID technology can be used to track carton contents at each store upon receipt. To implement this, RFID tag readers should be provided at store receiving entrances. Providing this technology decreases the time and labor required to manually track store receipts, improves accuracy of inventory data by eliminating inaccuracies in the manual receipt process and enables assumed receipts for direct delivery shipments. To accommodate this, the data collection system interfaces with inventory systems via the management tracking system and the management tracking system reports discrepancies between bill of lading and products received.

Detail Description Paragraph:

[0088] A significant advantage of using ubiquitous RFID technology within the stores is the ability to perform perpetual inventory counts. This can be achieved by providing hand-held readers for inventory counts or providing readers imbedded in walls for automated inventory count. The data received from these RFID tag readers is interfaced with the store inventory system. This automated perpetual inventory count system improves accuracy of inventory data, decreases the time and labor required to manually scan individual garments and provides real-time visibility to product gaps (for example, sizes, colors and styles) on the sales floor that may be replenished immediately from store inventory.

Detail Description Paragraph:

[0089] Naturally, ubiquitous use of RFID technology within the store also assists in loss prevention and security. In this context, the RFID technology can replace existing systems such as sensor tag technology, and thereby eliminate the labor required to attach and detach the sensor tags and improve security at stores that do not have sensor tag capabilities. To implement this feature, tag readers should be provided at store exits and staff should be trained to remove or flag as sold tags after sale.

Detail Description Paragraph:

[0091] Use of RFID technology associated with each unit, also makes it possible to read the contents of the customer's purchases at the point-of-sale to increase the accuracy of the checkout process, decrease time and labor required for checkout (cashier and wrapping activities) and decrease waiting time for the customer during checkout. To implement this feature of the present invention, tag readers should be provided at the checkout or cash/wrap station and the staff should be instructed in the removal and/or flagging of the tags as sold after sale. In addition, the data read should be interfaced with the point-of-sale system.

Detail Description Paragraph:

[0092] In accordance with another aspect of the present invention, RFID technology can be used to track assets at stores, distribution centers and other company facilities. In the context of a retail store, for example, RFID tags could be applied to assets, such as store fixtures, shelving, and the like. Small items such as hand held scanners or other equipment could also be tagged. By providing antennas (preferably fixed) throughout the facility, the assets that are tagged can be tracked for the purposes of planning, purchasing, management, and disposal. The use of RFID technology in this way provides systematic visibility of the assets as items are moved within stores, departments, cost centers, off-site storage, etc. Visibility would allow accountability and better management of assets resulting in accurate purchasing requirements, reduced on-hand quantities, and records to

provide an accurate tax base. In the context of fixtures used in a retail store, the visibility provided by use of RFID technology could be used to ensure that fixtures are located in conformance with store policy.

Detail Description Paragraph:

[0093] FIG. 6 shows a preferred embodiment of the present invention. One example of a fixture used in a retail store is a shelving system 602. Shelving system 602 includes shelves 604 and 606 that are designed to hold merchandise. Preferably, an RFID reader is associated with shelving system 602 and in an exemplary embodiment, shown in FIG. 6, several RFID readers are disposed proximate different collections of merchandise. As shown in FIG. 6, a first reader 608 is disposed proximate a first collection of merchandise 610, a second reader 612 is disposed proximate a second collection of merchandise 614, a third reader 616 is disposed proximate a third collection of merchandise 618, and a fourth reader 620 is disposed proximate a fourth collection of merchandise 622. The readers 608, 612, 616 and 620 are preferably configured in a manner that permits them to interrogate and read their associated collections but not other collections.

Detail Description Paragraph:

[0095] Shelving system 602 can provide many different types of information. Because Readers 608, 612, 616 and 620 can either continuously or intermittently interrogate RFID tags associated with merchandise, Shelving System 602 can provide near real time or real time data related to merchandise disposed on Shelving System 602. Also because the various readers are associated physically with Shelf System 602 at particular locations, Shelf System 602 can also provide information related to where the merchandise is located within Shelf System 602. For example if the merchandise is categorized and placed on Shelving System 602 by size, users can determine if merchandise has been improperly filed or improperly located within Shelf System 602. The information can also be used to determine real time inventory tracking and to determine what items are available or not available on the retail floor.

Detail Description Paragraph:

[0096] Shelving system 602 can also be used with wireless device 702. Wireless device 702 can be used to collect inventory information. This inventory information can be used to determine which items are currently on the sales floor, which items need to be replenished with stock from a backroom, and which items need to be ordered from a distribution center. The system can also be used to assist customers. If a customer asks for a particular item, for example, by size and style, the characteristics of the item can be entered into wireless device 702. The salesperson can then use wireless device 702 to scan and interrogate RFID tags. When a tag matching the description of the item requested by the customer is found, wireless device 702 can provide an indication. Preferably, wireless device 702 returns an audible indication. Wireless device 702 can also return a series of informative beeps or any other audible tones as the salesperson approaches the requested item. The audible tones can increase in pitch or frequency to guide the salesperson to the requested item.

Detail Description Paragraph:

[0098] Use of RFID technology at the store location also makes it possible to better control the return process by, for example, tracking reasons for returns back to the vendor factory level and therefore identify specific vendor factories producing garments with quality problems such as fit and other defects. In this way, the tags can be used to facilitate vendor performance tracking. Again, implementing the system requires tag readers at the cash/wrap (checkout) stations and a software interface with the point-of-sale system.

Detail Description Paragraph:

[0099] In accordance with another aspect of the present invention, RFID technology can be used to track the fitting room traffic. For this purpose, antennas would be

placed at the entrance of fitting rooms to read the tags of garments that are brought into the fitting room. In this way, a retailer can gather information as to what products are taken to fitting rooms--an indication of consumer interest (at least initial interest) in some aspect (style, color appearance etc.) of the garment. The fitting room data collected can be correlated to sales data to provide valuable insight as to which of the products that are tried by consumers are ultimately purchased. There are numerous ways in which information obtained from fitting room data collected (and e.g., correlated to sales data) can be used for merchandising, planning and/or marketing decisions for that specific product. For example, the data might show that a particular style of garment is frequently tried on, but seldom purchased, which could suggest a problem with the fit or detailing of the garment. Alternatively, the relationship between the frequency with which a garment is tried on and the garment's location within the store could be helpful in merchandising products. In this way, this technology provides an in-house market research tool.

CLAIMS:

1. A system for determining inventory comprising: a fixture including a first region and adapted to hold a first collection of merchandise, the first collection of merchandise comprising at least one item with an associated RFID tag; a reader disposed on the fixture and proximate the collection of merchandise, and the reader adapted to interrogate the RFID tag and retrieve information related to the RFID tag.
2. The system according to claim 1, wherein the first collection of merchandise includes a second item with an associated RFID tag.
3. The system according to claim 1, wherein the fixture is adapted to hold a second collection of merchandise and wherein a second reader is disposed on the fixture and proximate the second collection of merchandise, and wherein the second reader is adapted to interrogate and read a second RFID tag associated with the second collection of merchandise.
4. The system according to claim 3, wherein the first reader is adapted to read the first collection of merchandise but is not adapted to read the second collection of merchandise.
5. The system according to claim 4, wherein the second reader is adapted to read the second collection of merchandise but is not adapted to read the first collection of merchandise.
6. The system according to claim 1, wherein the fixture is capable of sensing available inventory disposed on the fixture in near real time.
8. A method for determining inventory comprising the steps of: (a) associating a first RFID tag with a first item of merchandise; (b) placing the first item proximate a first location of a fixture; (c) placing a first RFID reader proximate the first location of the fixture; and (d) interrogating the RFID tag associated with the item with the reader.
9. The method according to claim 8, further comprising the step of associating a second RFID tag with a second item of merchandise and placing the second item proximate the first location.
10. The method according to claim 9, further comprising the step of associating a third RFID tag with a third item of merchandise and placing the third item proximate a second location of the fixture.
13. A method for obtaining inventory information comprising the steps of: (a)

associating a first RFID tag with a first item of merchandise; (b) placing the first item proximate a first location of a fixture; (c) placing a first RFID reader proximate the first location of the fixture; (d) interrogating the RFID tag associated with the item with a wireless handheld device.

18. The method according to claim 13, wherein the wireless handheld device can interrogate a plurality of RFID tags and collect information related to those tags in order to determine available inventory.

19. A system for using radio frequency identification (RFID) in a supply chain of a retail operation organization, the system comprising: an RFID tag is associated with each item to be tracked; a plurality of tag readers disposed at various locations throughout the supply chain; at least one host computer for receiving and processing information from the tag readers and interfacing with a system used for at least one of inventory, operations and logistics.

20. The system according to claim 19, wherein the at least one host computer for receiving and processing information from the tag readers interfaces with a system used for inventory and a system used for logistics.

21. A method for using radio frequency identification (RFID) in retail operations, the method comprising the steps of: associating an RFID tag with each item to be tracked; placing a plurality of tag readers at locations throughout the supply chain; and providing at least one host computer for receiving and processing information from the tag readers and interfacing with at least one of: inventory, operations and logistics systems.

22. The method according to claim 21, wherein the step of associating an RFID tag with each item to be tracked comprises step of sewing an RFID tag into a garment; and wherein the method further comprises the step of storing vendor/manufacturer identification information in the RFID memory to enable the tracking of customer returns due to poor quality of merchandise produced by the vendor/manufacturer.

25. The method according to claim 21, further comprising the steps of using RFID technology to scan RFID tagged goods in the storage when an item is not in stock on the sales floor, whereby the method is used to reduce lost sales due to merchandise not on the sales floor, comprising the steps of collecting and storing data concerning items in storage collection and storing data concerning items in stock on the sales floor and comparing the data to identify items that are in storage, but not in stock on the sales floor.

27. The method according to claim 21, further comprising the step of correlating the fitting room data with other data, wherein the other data is sales data.

30. The method according to claim 21, comprising the steps of: providing hand held readers for inventory counts; receiving data received from the readers and interfacing the data with the store inventory system, whereby continuous inventory counts can be performed.

31. The method according to claim 21, comprising the steps of: providing readers proximate merchandise for automated inventory count; receiving data received from the readers and interfacing the data with the store inventory system, whereby continuous inventory counts can be performed.

32. The method for using radio frequency identification in retail operations according to claim 21, further comprising the step of comparing data identifying items on the sales floor to data identifying items that are in stock to determine items in stock that are not on display; and providing notice of such condition.

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L8: Entry 57 of 57

File: USPT

Mar 16, 1999

DOCUMENT-IDENTIFIER: US 5883582 A

**** See image for Certificate of Correction ****

TITLE: Anticollision protocol for reading multiple RFID tags

Brief Summary Text (3):

Intelligent tagging of articles provides substantial benefits at the point of manufacture, at the point of distribution, and at the point of sale. That is, any place where articles are stored, shelved, displayed or inventoried, intelligent tags can result in substantial cost savings. For example, one function of a distribution center is to take merchandise that has been packed and shipped in bulk, and repack the merchandise into smaller "tote" boxes. Often the tote box is packed with single units of a variety of products. Mistakes in inventory during this repacking process can be very costly and there is a possibility of shipping products to the wrong retailer. An intelligent tagging system can check the contents of tote boxes with an interrogator or point reader at high speeds and confirm exactly what is being shipped to individual retailers.

Brief Summary Text (4):

Employees today spend many hours hand counting articles for inventory control and manually checking product expiration dates. Intelligent tags obviate the need for such hand counting and manual data checking. Rather than hand counting a plurality of items, an employee can point an intelligent tag reader at individual product clusters on shelves and scan entire product groups in minutes. Intelligent tags also allow employees to scan a product group to learn critical expiration dates to avoid spoilage, reduce stock and maintain continuous inventory counts.

Brief Summary Text (5):

Another example of an environment in which the use of intelligent tags is desirable is a library. Manual taking of inventory of a library collection is an expensive and time consuming task. Currently inventory taking is such an expensive and time consuming task that most libraries do not conduct a full inventory check as frequently as they should, if at all. Accordingly, there is a need for systems which allow library employees to efficiently check their inventory. Intelligent tags fulfill such a need.

Detailed Description Text (24):

The RFID device 10 has many applications, including inventory control of tagged items, such as for books in a library, raw materials in a manufacturing environment, or merchandise in a retail environment. It will also be apparent to those of skill in the art that the device 10 can be used in many other commercial applications. Although the invention is described with reference to resonant circuit tags, and in particular, radio frequency identification (RFID) tags which are powered by a radio frequency interrogation signal, it will be recognized by those of ordinary skill in the art that the inventive concepts disclosed are applicable to other devices which would benefit from the output protocol disclosed herein. Accordingly, the present invention is not meant to be limited to RFID tags.

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L8: Entry 50 of 57

File: USPT

May 2, 2006

DOCUMENT-IDENTIFIER: US 7036729 B2
TITLE: Article tracking method and system

PRIOR-PUBLICATION:

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US 20050150952 A1

July 14, 2005

Brief Summary Text (2):

In a manufacturing operation, in a warehousing operation, in a shipping and/or receiving operation, in a transportation operation, in a wholesale or a retail merchandising operation, and in many other operations there is a desire to maintain a complete, accurate and up to date inventory or other record of the units of products made, stored, received, processed, shipped and/or sold. Automated or automatic methods of providing such record are desirable, however, conventional methods all have shortcomings that result in less than the desired record being provided.

Description Paragraph (13):

FIG. 1 is a schematic block diagram illustrating an example embodiment of a tracking system 10 in accordance with the invention. System 10 includes one or more "operation lines" 100-1, 100-2, . . . 100-N of stations OS-1, OS-2, . . . OS-N within or associated with one or more plants or facilities or parts thereof. Operation line refers to any collection or group of one or more stations OS-1, OS-2, . . . OS-N at which one or more related or unrelated operations may be performed. Dotted line 102 indicates that additional stations 100 may be included. Examples of operations include, but are not limited to, manufacturing operations, processing, testing, inspecting, operation timing, productivity monitoring, work and/or time recording, inventory operations, quality control operations, shipping operations, receiving operations, storage operations, sales operations, displaying, buying operations, wholesale operations and retail operations.

Description Paragraph (28):

The information so obtained may, in addition to being used for tracking articles A and control of stations OS, be used for management such as for calculating efficiency, product yield, operator work time and idle time and break time, productivity, and process metrics. Such information as used in manufacturing and inventory control may be used directly for standard MRPII or standard manufacturing resource/requirement planning. Typically and preferably, the information so obtained is communicated to the processor LC, 200 for monitoring and control and preferably is also transmitted via control unit CU and antenna array 130 to antenna ANT of smart tag ST and stored in electronic memory EM thereof.

Description Paragraph (39):

In addition to such tracking and monitoring of parts, components, materials, and work in process on an essentially real-time basis, rates of usage, inventory and replenishment ordering may also be controlled, such as for "just-in-time" and similar purchasing and inventory managing. Further, excessive usage, process inefficiency and theft may be uncovered. With operator entry of information at a

given station OS via a keypad or keyboard, explanations of excess material usage, materials substitutions, and the like can be utilized to reduce discrepancies and/or inconsistencies between the actual bill of material and a theoretical or planned bill of material.

Description Paragraph (40):

FIG. 2 also illustrates the use of the present invention in subsequent operations of different kinds with compatible smart tag readers and/or writers. When article A has moved along the path indicated by arrow 140 and leaves station OS-4 passing through antenna array 130-4, path 140 splits, for example, in two or more possible different directions 142, 144. These directions may lead to any conceivable use or disposition for articles A. Examples include storage, distribution, exhibition or display, sales, shipping or transport, and the like.

Description Paragraph (41):

Direction 142, for example, leads to a warehouse WH or other storage or distribution facility in which articles A-1-A-N are stored, e.g., as inventory. Within warehouse WH are various storage areas SA of two SA-1, SA-2 are illustrated. Storage areas SA may be physical floor spaces, shelving units, cabinets, racks or bins and the like. As illustrated, articles A-1 and A-2 having smart tags ST-1 and ST-2, respectively, thereon are in storage area SA-1 and articles A-3 and A-N having smart tags ST-3 and ST-N, respectively, thereon are in storage area SA-2.

Description Paragraph (44):

This not only facilitates reconciliation of inventory total quantity and identity with information of identity, quantity and location read from the smart tags ST in each storage area SA, but facilitates the detection of unauthorized moving or removing of articles A. In addition, this capability also facilitates the handling of time-sensitive articles (those that spoil, degrade or expire with passage of time) on a first-in first-out basis to minimize spoilage and of expiration.

Description Paragraph (48):

For example, when system 10 is utilized in a store or retail sales environment, such as where inventory status is desired, the stations have different names and functions (operations), but operation of the system is as described above. With regard to FIG. 2, station 1 (OS-1) could, for example, be a receiving dock, station 2 (OS-2) could be storage bins in a stockroom, storeroom or warehouse, station 3 (OS-3) could be display racks and shelves in a customer area, and station 4 (OS-4) could be the checkout station.

Description Paragraph (49):

Merchandise to be sold (i.e. articles A) arrives at receiving dock OS-1 (station 1) either already tagged with smart tags ST or is tagged upon arrival. If articles A are tagged when they arrive, then it is desirable to have an antenna array entrance gate 130 through which the articles pass to get to the receiving dock OS-1 so that the smart tags ST thereon are read and information pertaining to the articles is recorded as an inventory record. The operation of station 1 is receiving.

Description Paragraph (50):

The smart tags ST applied may be adhesive tags that adhere to the articles A or may be included in a relatively large conventional reusable circular anti-theft devices of the sort available from Check-Point Systems of Thorofare, N.J., typically utilized in retail clothing stores. These conventional anti-theft devices are large so as to be obvious and cannot be removed from the article without damaging the fabric or other material from which the article is made, unless removed using a special tool or release device generally not available to the public. Typically, a smart tag ST employing an I-CODE semiconductor chip from Philips is configured in form to fit inside such conventional anti-theft device so that the anti-theft device and the smart tag ST cooperate to reduce theft and lost or misplaced merchandise (articles).

Description Paragraph (51):

If the articles do not come with smart tags, then smart tags ST are affixed to the articles before the articles A are moved to the stockroom or storeroom OS-2 (station 2). In either case, articles A are moved to the stockroom OS-2 (station 2) passing through antenna array 130-1 along the path indicated by arrow 140, whereby information read from smart tag ST is recorded as an inventory record in processor LC, 200. Station 2 may include a plurality of storage bins or spaces similar to areas SA-1, SA-2, . . . , each having an all-orientation antenna array 130, so that the location, quantity, identity and other information regarding the articles A stored therein may be ascertained at any time by utilizing the antenna arrays 130 associated with such bins SA to read the smart tags ST associated with the articles A stored therein.

Description Paragraph (52):

The preferred smart tag ST for such retail application is an RFID "passive" tag operating at 13.56 MHZ or another common RFID tag frequency. The memory of the electronic device of smart tag ST can be partitioned to contain required information for inventory purposes, such as the universal product code (UPC), the specific manufacturer, make or brand name, the specific model or type, the specific piece, pricing, date of receipt, and other relevant and/or desired or useful information.

Description Paragraph (53):

Station 3 (OS-3) is the retail display space, showroom or other area where customers may inspect and/or select articles A for purchase. The operation of station 3 is merchandise display, whether the customer actually purchases the articles A displayed or makes a selection from the articles displayed and receives an article A from the storeroom OS-2 (station 2). Articles A moving out of storage area OS-2 (station 2) pass through the detection area of antenna array 130-2 and the smart tags ST associated therewith are read and the information read is used to create a record of the article A leaving the storeroom OS-2. Sections of the display shelves, display cases, showroom areas and the like are fitted with antenna arrays 130-3, which can be built into attractive decorated display shelves to show the articles advantageously for customer selection, so that the identity, type and quantity of articles in the showroom/retail space is always available by reading the information from the smart tags ST associated therewith.

Description Paragraph (54):

An all orientation antenna array 130-4 is also incorporated into the checkout counter OS-4 (station 4) at which purchases are recorded, tabulated and where the customer pays by cash, credit card or other method of payment. The operation of station 4 is order tabulation and payment. As articles A with associated smart tags ST pass through the detection region of antenna array 130-4, each is read and the information therefrom is communicated to the computer LC or 200 which tabulates the purchases automatically and quickly, and at the same time updates the inventory records to reflect the sale of those specific articles. Once the articles are paid for, the anti-theft devices with smart tags ST therein may be removed from the articles A purchased or the electronic memories of the smart tags associated with the articles A purchased may be erased or may be coded to indicate they have been purchased, so that they will not set off an anti-theft alarm as the articles are taken from the store.

Description Paragraph (55):

A display (not shown) may be associated with checkout station OS-4, such as an LED, CRT, LCD or other display to display information regarding a particular sale/purchase for the employee and customer. If the store has a so-called "loyalty" program that awards "points" or other representations of purchases made (similar to airline frequent flyer and hotel frequent guest loyalty programs) for which the customer is issued a smart card (similar to a smart tag, but in the form of a card,

usually about credit-card size), antenna array 130-4 associated with checkout station OS-4 can also read the customer's loyalty program information from the customer's loyalty program smart card and then credit the customer's loyalty program account for the purchases made and write the current updated information to the memory of the customer's loyalty program smart card. The customer information read from the loyalty program smart card may also be used to display a greeting to the customer by name on the display and/or to greet the customer aurally using a speech synthesizer.

Description Paragraph (57):

In addition, if store employees are issued individual smart tags ST', then transactions may be associated with particular employees to monitor performance quality and deter theft. The employee operating checkout station OS-4 can be associated with each sale and article A sold, and checkout station OS-4 can be arranged to be non functional and/or to register an alarm if the smart tag ST' of the assigned employee is not within a prescribed distance (e.g., about 2 5 feet or about 0.6 1.6 meters) of that station when articles a are passed therethrough.

Description Paragraph (58):

Advantageously, checkout counter OS-4 employing antenna array 130-4 is more efficient and should be quicker and less prone to error than are conventional bar-code scanning check out systems which require the article to be in close proximity to and in line-of-sight communication with the bar code scanner, and yet have a significant error rate. In addition, a complete and accurate inventory covering each area and aspect of the particular retail operation is available in real time and with an extremely low error rate, which is aided by the all-orientation antenna arrays.

Description Paragraph (59):

Also advantageously, because the same devices and infrastructure for communication and processing can be utilized for both anti-theft control and for inventory control operations, the cost should be less than if different systems were to be used for each operation. Moreover, an additional antenna array 130-4B (not shown, in addition to array 130-4A at the checkout) near the store exit may be added simply and with little additional expense, further enhancing anti-theft control.

Description Paragraph (65):

Applications programs suitable for recording and manipulating the information include relational database software such as the Windows-NT-based Microsoft ACCESS database as well as ORACLE, SYBASE and INFORMIX database software, and software languages such as Visual Basic, Java, or other language compliant with American National Standards Institute (ANSI) Standard 256. Each database record will typically include fields some or all of the following information: The article identification and/or serial number and/or quantity; station and/or operation identification, entry and exit time data (arriving and leaving), date, bill of material data, actual/planned material usage, keypad/keyboard entered data, component/part/material smart tag information, operator/employee/individual smart tag information, quality control and inspection data, transport provider, and the like. Thus, the database maintains an inventory of the articles, their quantities and locations and may be utilized to categorize the data contained in the database records for tracking any article or any type or group of articles, and/or any station so also provide status and inventory by station, operator or any other desired category of the stored records. Typically, the database software interfaces with other standard software, such as the standard MRPII software available from the Great Plains division of Microsoft Corporation of Redmond, Wash.

CLAIMS:

7. The method of claim 1 wherein the operation performed at a station includes a sale, purchase or transfer of an article, the method further comprising: removing

the RFID tag from the article sold, purchased or transferred, or erasing or coding the electronic memory of the RFID tag associated with the article sold, purchased or transferred to indicate the article has been sold, purchased or transferred.

8. The method of claim 1: wherein the electronic memory of the RFID tag contains information including any one or more of: inventory information, universal product code (UPC), manufacturer, make or brand name, model or type, a specific piece, a serial number, a batch identifier, a lot identifier, an identifying number, pricing, date of manufacture, and date of receipt; or wherein the electronic memory of the RFID tag includes information stored therein by a station relating to the identity of that station, to the operation performed at that station, or to both; or wherein the electronic memory of the RFID tag includes a relational check number representative of the information stored therein; or wherein the RFID tag includes thereon in human-readable form, in machine-readable form, or in both forms, all or part of the information stored in the electronic memory thereof; or wherein the RFID tag is resistant to tampering, enables detection of tampering, or both; or wherein the RFID tag is any one or more of tamper-resistant, tamper-destruct, tamper-evident, and high-temperature resistant; or wherein the RFID tag is removable or re-encodable or both for reuse; or any combination of the foregoing.

9. The method of claim 1 wherein the operation performed at ones of the plurality of stations includes at least one of a manufacturing operation, processing, testing, inspecting, operation timing, productivity monitoring, work and/or time recording, an inventory operation, inventory control, inventory management, tracking articles arriving and leaving, a quality control operation, personnel time and attendance recording, a management operation, access control, a distribution operation, a transport operation, a shipping operation, a receiving operation, a storage operation, a display operation, exhibition, a sales operation, a loyalty program, a buying operation, a wholesale operation and a retail operation.

16. The system of claim 11 wherein the one or more articles are one or more products, wherein one or more of the monitoring stations are in a location for any one or more of manufacturing, quality monitoring, inventory monitoring, distribution and shipping, and wherein one or more of the tracking stations are in a location for any one or more of distribution, shipping, transport, and receiving.

17. The system of claim 11 wherein said monitoring stations, said tracking stations, or both, provide any one or more of: tracking and monitoring of parts, components, materials, and work in process on an essentially real-time basis, rates of usage, inventory and replenishment ordering, "just-in-time" purchasing, purchasing, inventory managing, excessive usage monitoring, process efficiency monitoring, and theft monitoring, explanations of excess material usage, materials substitutions, and monitoring consistency between an actual bill of material and a theoretical or planned bill of material.

18. The system of claim 11 wherein the electronic memory of said RFID tag contains information including any one or more of: inventory information, universal product code (UPC), manufacturer, make or brand name, model or type, a specific piece, a serial number, a batch identifier, a lot identifier, an identifying number, pricing, date of manufacture, and date of receipt; or wherein the electronic memory of the RFID tag includes information stored therein by a monitoring station, a tracking station, or both, relating to the identity of that station, to the operation performed at that station, or to both; or wherein the electronic memory of said RFID tag includes a relational check number representative of the information stored therein; or wherein said RFID tag includes thereon in human-readable form, in machine-readable form, or in both forms, all or part of the information stored in the electronic memory thereof; or wherein said RFID tag is resistant to tampering, enables detection of tampering, or both; or wherein said RFID tag is any one or more of tamper-resistant, tamper-destruct, tamper-evident,

and high-temperature resistant; or wherein said RFID tag is removable or re-encodable or both for reuse; or any combination of the foregoing.

19. The system of claim 11 wherein at least one of said tracking stations comprises any one or more of a retail display space, a showroom, an area where customers may inspect and/or select articles for purchase a merchandise display, a storage area, a container, a pallet, a display shelf, a display case, and a showroom area, so that the identity, type and quantity of articles thereat is available by reading the information from the RFID tags thereof.

20. The system of claim 11 wherein one or more of the articles are sold or transferred, and wherein the RFID tag associated with the article sold or transferred is any one or more of: removed from the article, retained as a record of the history of the article, erased or changed to indicate the sale or transfer of the article, erased for reuse, removed from a container containing the article, and otherwise disassociated from the article.

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File: PGPB

Nov 13, 2003

DOCUMENT-IDENTIFIER: US 20030209601 A1
TITLE: Article tracking system and method

Summary of Invention Paragraph:

[0016] In a manufacturing operation, in a warehousing operation, in a shipping and/or receiving operation, in a transportation operation, in a wholesale or a retail merchandising operation, and in many other operations there is a desire to maintain a complete, accurate and up to date inventory or other record of the units of products made, stored, received, processed, shipped and/or sold. Automated or automatic methods of providing such record are desirable, however, conventional methods all have shortcomings that result in less than the desired record being provided.

Detail Description Paragraph:

[0034] FIG. 1 is a schematic block diagram illustrating an example embodiment of a tracking system 10 in accordance with the invention. System 10 includes one or more "operation lines" 100-1, 100-2, . . . 100-N of stations OS-1, OS-2, . . . OS-N within or associated with one or more plants or facilities or parts thereof. Operation line refers to any collection or group of one or more stations OS-1, OS-2, . . . OS-N at which one or more related or unrelated operations may be performed. Dotted line 102 indicates that additional stations 100 may be included. Examples of operations include, but are not limited to, manufacturing operations, processing, testing, inspecting, operation timing, productivity monitoring, work and/or time recording, inventory operations, quality control operations, shipping operations, receiving operations, storage operations, sales operations, displaying, buying operations, wholesale operations and retail operations.

Detail Description Paragraph:

[0049] The information so obtained may, in addition to being used for tracking articles A and control of stations OS, be used for management such as for calculating efficiency, product yield, operator work time and idle time and break time, productivity, and process metrics. Such information as used in manufacturing and inventory control may be used directly for standard MRPII or standard manufacturing resource/requirement planning. Typically and preferably, the information so obtained is communicated to the processor LC, 200 for monitoring and control and preferably is also transmitted via control unit CU and antenna array 130 to antenna ANT of smart tag ST and stored in electronic memory EM thereof.

Detail Description Paragraph:

[0060] In addition to such tracking and monitoring of parts, components, materials, and work in process on an essentially real-time basis, rates of usage, inventory and replenishment ordering may also be controlled, such as for "just-in-time" and similar purchasing and inventory managing. Further, excessive usage, process inefficiency and theft may be uncovered. With operator entry of information at a given station OS via a keypad or keyboard, explanations of excess material usage, materials substitutions, and the like can be utilized to reduce discrepancies and/or inconsistencies between the actual bill of material and a theoretical or planned bill of material.

Detail Description Paragraph:

[0061] FIG. 2 also illustrates the use of the present invention is subsequent operations of different kinds with compatible smart tag readers and/or writers. When article A has moved along the path indicated by arrow 140 and leaves station OS-4 passing through antenna array 130-4, path 140 splits, for example, in two or more possible different directions 142, 144. These directions may lead to any conceivable use or disposition for articles A. Examples include storage, distribution, exhibition or display, sales, shipping or transport, and the like.

Detail Description Paragraph:

[0062] Direction 142, for example, leads to a warehouse WH or other storage or distribution facility in which articles A-1-A-N are stored, e.g., as inventory. Within warehouse WH are various storage areas SA of two SA-1, SA-2 are illustrated. Storage areas SA may be physical floor spaces, shelving units, cabinets, racks or bins and the like. As illustrated, articles A-1 and A-2 having smart tags ST-1 and ST-2, respectively, thereon are in storage area SA-1 and articles A-3 and A-N having smart tags ST-3 and ST-N, respectively, thereon are in storage area-SA-2.

Detail Description Paragraph:

[0065] This not only facilitates reconciliation of inventory total quantity and identity with information of identity, quantity and location read from the smart tags ST in each storage area SA, but facilitates the detection of unauthorized moving or removing of articles A. In addition, this capability also facilitates the handling of time-sensitive articles (those that spoil, degrade or expire with passage of time) on a first-in first-out basis to minimize spoilage and of expiration.

Detail Description Paragraph:

[0069] For example, when system 10 is utilized in a store or retail sales environment, such as where inventory status is desired, the stations have different names and functions (operations), but operation of the system is as described above. With regard to FIG. 2, station 1 (OS-1) could, for example, be a receiving dock, station 2 (OS-2) could be storage bins in a stockroom, storeroom or warehouse, station 3 (OS-3) could be display racks and shelves in a customer area, and station 4 (OS-4) could be the checkout station.

Detail Description Paragraph:

[0070] Merchandise to be sold (i.e. articles A) arrives at receiving dock OS-1 (station 1) either already tagged with smart tags ST or is tagged upon arrival. If articles A are tagged when they arrive, then it is desirable to have an antenna array entrance gate 130 through which the articles pass to get to the receiving dock OS-1 so that the smart tags ST thereon are read and information pertaining to the articles is recorded as an inventory record. The operation of station 1 is receiving.

Detail Description Paragraph:

[0071] The smart tags ST applied may be adhesive tags that adhere to the articles A or may be included in a relatively large conventional reusable circular anti-theft devices of the sort available from Check-Point Systems of Thorofare, N.J., typically utilized in retail clothing stores. These conventional anti-theft devices are large so as to be obvious and cannot be removed from the article without damaging the fabric or other material from which the article is made, unless removed using a special tool or release device generally not available to the public. Typically, a smart tag ST employing an I-CODE semiconductor chip from Philips is configured in form to fit inside such conventional anti-theft device so that the anti-theft device and the smart tag ST cooperate to reduce theft and lost or misplaced merchandise (articles).

Detail Description Paragraph:

[0072] If the articles do not come with smart tags, then smart tags ST are affixed

to the articles before the articles A are moved to the stockroom or storeroom OS-2 (station 2). In either case, articles A are moved to the stockroom OS-2 (station 2) passing through antenna array 130-1 along the path indicated by arrow 140, whereby information read from smart tag ST is recorded as an inventory record in processor LC, 200. Station 2 may include a plurality of storage bins or spaces similar to areas SA-1, SA-2, . . . , each having an all-orientation antenna array 130, so that the location, quantity, identity and other information regarding the articles A stored therein may be ascertained at any time by utilizing the antenna arrays 130 associated with such bins SA to read the smart tags ST associated with the articles A stored therein.

Detail Description Paragraph:

[0073] The preferred smart tag ST for such retail application is an RFID "passive" tag operating at 13.56 MHZ or another common RFID tag frequency. The memory of the electronic device of smart tag ST can be partitioned to contain required information for inventory purposes, such as the universal product code (UPC), the specific manufacturer, make or brand name, the specific model or type, the specific piece, pricing, date of receipt, and other relevant and/or desired or useful information.

Detail Description Paragraph:

[0074] Station 3 (OS-3) is the retail display space, showroom or other area where customers may inspect and/or select articles A for purchase. The operation of station 3 is merchandise display, whether the customer actually purchases the articles A displayed or makes a selection from the articles displayed and receives an article A from the storeroom OS-2 (station 2). Articles A moving out of storage area OS-2 (station 2) pass through the detection area of antenna array 130-2 and the smart tags ST associated therewith are read and the information read is used to create a record of the article A leaving the storeroom OS-2. Sections of the display shelves, display cases, showroom areas and the like are fitted with antenna arrays 130-3, which can be built into attractive decorated display shelves to show the articles advantageously for customer selection, so that the identity, type and quantity of articles in the showroom/retail space is always available by reading the information from the smart tags ST associated therewith.

Detail Description Paragraph:

[0075] An all orientation antenna array 130-4 is also incorporated into the checkout counter OS-4 (station 4) at which purchases are recorded, tabulated and where the customer pays by cash, credit card or other method of payment. The operation of station 4 is order tabulation and payment. As articles A with associated smart tags ST pass through the detection region of antenna array 130-4, each is read and the information therefrom is communicated to the computer LC or 200 which tabulates the purchases automatically and quickly, and at the same time updates the inventory records to reflect the sale of those specific articles. Once the articles are paid for, the anti-theft devices with smart tags ST therein may be removed from the articles A purchased or the electronic memories of the smart tags associated with the articles A purchased may be erased or may be coded to indicate they have been purchased, so that they will not set off an anti-theft alarm as the articles are taken from the store.

Detail Description Paragraph:

[0076] A display (not shown) may be associated with checkout station OS-4, such as an LED, CRT, LCD or other display to display information regarding a particular sale/purchase for the employee and customer. If the store has a so-called "loyalty" program that awards "points" or other representations of purchases made (similar to airline frequent flyer and hotel frequent guest loyalty programs) for which the customer is issued a smart card (similar to a smart tag, but in the form of a card, usually about credit-card size), antenna array 130-4 associated with checkout station OS-4 can also read the customer's loyalty program information from the customer's loyalty program smart card and then credit the customer's loyalty

program account for the purchases made and write the current updated information to the memory of the customer's loyalty program smart card. The customer information read from the loyalty program smart card may also be used to display a greeting to the customer by name on the display and/or to greet the customer aurally using a speech synthesizer.

Detail Description Paragraph:

[0078] In addition, if store employees are issued individual smart tags ST', then transactions may be associated with particular employees to monitor performance quality and deter theft. The employee operating checkout station OS-4 can be associated with each sale and article A sold, and checkout station OS-4 can be arranged to be non-functional and/or to register an alarm if the smart tag ST' of the assigned employee is not within a prescribed distance (e.g., about 2-5 feet or about 0.6-1.6 meters) of that station when articles a are passed therethrough.

Detail Description Paragraph:

[0079] Advantageously, checkout counter OS-4 employing antenna array 130-4 is more efficient and should be quicker and less prone to error than are conventional bar-code scanning check out systems which require the article to be in close proximity to and in line-of-sight communication with the bar code scanner, and yet have a significant error rate. In addition, a complete and accurate inventory covering each area and aspect of the particular retail operation is available in real time and with an extremely low error rate, which is aided by the all-orientation antenna arrays.

Detail Description Paragraph:

[0080] Also advantageously, because the same devices and infrastructure for inventory communication and processing can be utilized for both anti-theft control and for inventory control operations, the cost should be less than if different systems were to be used for each operation. Moreover, an additional antenna array 130-4B (not shown, in addition to array 130-4A at the checkout) near the store exit may be added simply and with little additional expense, further enhancing anti-theft control.

Detail Description Paragraph:

[0086] Applications programs suitable for recording and manipulating the information include relational database software such as the Windows-NT-based Microsoft ACCESS database as well as ORACLE, SYBASE and INFORMIX database software, and software languages such as Visual Basic, Java, or other language compliant with American National Standards Institute (ANSI) Standard 256. Each database record will typically include fields some or all of the following information: The article identification and/or serial number and/or quantity, station and/or operation identification, entry and exit time-data (arriving and leaving), date, bill of material data, actual/planned material usage, keypad/keyboard entered data, component/part/material smart tag information, operator/employee/individual smart tag information, quality control and inspection data, transport provider, and the like. Thus, the database maintains an inventory of the articles, their quantities and locations and may be utilized to categorize the data contained in the database records for tracking any article or any type or group of articles, and/or any station so also provide status and inventory by station, operator or any other desired category of the stored records. Typically, the database software interfaces with other standard software, such as the standard MRPII software available from the Great Plains division of Microsoft Corporation of Redmond, Wash.

CLAIMS:

14. The system of claim 1 wherein the operation performed at ones of the plurality of stations includes at least one of a manufacturing operation, processing, testing, inspecting, operation timing, productivity monitoring, work and/or time recording, an inventory operation, a quality control operation, personnel time and

attendance recording, a shipping operation, a receiving operation, a storage operation, a display operation, a sales operation, a buying operation, a wholesale operation and a retail operation.

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L8: Entry 55 of 57

File: USPT

May 11, 2004

DOCUMENT-IDENTIFIER: US 6732934 B2

TITLE: Escorted shopper system

Abstract Text (1):

A sales system having a plurality of wearable portable terminals each having an optical code reader and a wireless transceiver, a plurality of stationary terminals each having a wireless transceiver and a central database having information relating to goods to be sold by the system. A wireless network interconnects the portable terminals, stationary terminals and the central database.

Brief Summary Text (2):

The present invention relates to a sales system, and in particular to an escorted shopper system.

Brief Summary Text (3):

Sales systems which incorporate portable terminals that are used by the shoppers to record purchases are known.

Brief Summary Text (4):

It has become apparent in retail stores that customers desire improved service, but it is difficult to provide with inexperienced employees and insufficient inventory information available to employees on the sales floor. Moreover, existing systems require the sales person to leave the customer to find out information that the customer seeks, and customers perceive this as poor service.

Brief Summary Text (5):

The main object of the present invention is to improve the known sales systems and to provide an escorted shopper system wherein the salesperson can accompany the customer on the sales floor even when information is being gathered for the customer.

Brief Summary Text (9):

The escorted shopper system empowers any employee in a retail setting to provide a more personal shopping experience by enabling the employee to escort the customer through every aspect of the shopping trip. Beginning as early as the point of entry in the store and continuing through the points of decision and ending at the point of sale, the employee is able to assist with anything, as well as complete the sale, without ever having to leave the customer. The system according to the present invention provides the platform that enables any store employee to completely follow through with any customer allowing a totally customized shopping experience.

Brief Summary Text (10):

The escorted shopper system in accordance with the invention provides all the necessary tools for dealing with a customer, including sales assistance, communication, transactional capabilities and access to inventory. The present invention consolidates all of these functions into one wearable, portable terminal that can be used by employees as part of the shopper system.

Brief Summary Text (11):

The escorted shopper system according to the present invention can operate in sales mode, inventory mode and transaction mode.

Brief Summary Text (12):

In the sales mode, the escorted shopper system serves as an on the spot resource for the employee, feeding the employee product, policy and/or customer service information as needed. Furthermore, the portable terminal acts as a communication link among employees, ensuring immediate sales or security assistance. In both cases, it eliminates the need for the employee to go to other areas of the store for assistance and leave the customer waiting. The portable terminal and the system provide an open platform for information dispersal and communication among employees, empowering the employees to more effectively and knowledgeably interface with customers. The customer is able to get a running total of chosen items before purchase, have any questions relating to those purchases answered, even by inexperienced employees, and enable the customer to find exactly what the customer is looking for.

Brief Summary Text (13):

In the inventory mode, the portable terminal and system allows an employee remote access to inventory databases, local or otherwise, as well as the ability to contribute to those databases in real time. The employee can actively update the database to insure accuracy. The system can act as a tracking system, not only of the in-store merchandise, but availability anywhere and creates the potential to close sales on merchandise outside the store's premises. Accurate tracking of inventory is extremely important for a retailer and up to the minute data integrity means never having to look in the stock for desired items, since this knowledge is at the employee's fingertips.

Brief Summary Text (14):

In the transactional mode, the terminal and system allows a customer to make a cashless transaction or multiple transactions anywhere in the store. This eliminates the need to wait in line and allows the processing of returns with credit given to an account. The portable units within the system act as a mobile point of sale, allowing an employee to conclude the transaction anywhere in the store.

Brief Summary Text (15):

In accordance with the invention, the escorted shopper system has two main components, the wearable, portable terminal which is worn by all employees and a series of stationary terminals which can be moved to different locations in a store, but are not portable. Both operate within the wireless network setup within the store. The wearable, portable terminal acts as a thin client utilizing wireless transceivers, preferably RF, while the stationary terminals act as an access point for information dissemination. Within the wireless network, employees are enabled to access and contribute to multiple databases remotely. The stationary terminals serve the employee and the customer by being both a mobile point of sale, as well as an informational kiosk and a self-service scanner.

Brief Summary Text (16):

The wearable, portable terminal, because it is connected to the network, has a display which serves as a window into the multiple databases accessible by the network. The employee is always connected to the store's computer and to other employees. The network in accordance with the present invention allows for voice over IP and therefore sales and security assistance can be obtained in real time and independent of physical proximity.

Brief Summary Text (17):

The wearable, portable terminals also preferably have a small laser scanner integrated therein to create the opportunity for cataloging merchandise real time

anywhere in the store. A simple scan of the bar code on a tag can reconcile shrinkage and misplaced merchandise, as well as differentiate between sale and regularly priced items.

Brief Summary Text (20):

The stationary terminals can, in a compact configuration, contain only a display, a scanner, a printer, a magnetic stripe reader and peripheral fixtures, such as hanger and bag racks. After the customer's card has been swiped on the sales floor, the information can be relayed to the closest stationary terminal where the receipt is printed. Signature and bagging can take place at the stationary terminal as well. The terminals can also be used to present advertisements or as informational sources for customers, inviting the customers to use them for obtaining information about items within the store. The scanner associated with the stationary terminal, which is preferably an omni-directional scanner, would allow the customers to get a running total of chosen items at the terminal if they so choose. The stationary terminals are preferably not intended to replace point of sale terminals, but in addition thereto.

Brief Summary Text (21):

In one example of the use of the present invention, a sales associate for the retail store arrives at work and punches in an employee identification number into the network and is issued a portable, wearable terminal that is now connected to the storewide wireless network. The device automatically informs the employee of who is working with him and what positions they are assigned to. The employee can also use the system to find out for himself what floor positions are not already filled, so he can take one of those positions. The employee can also find out from the system that two employees are actively updating inventory and three employees are actively tied to the cash wrap and only two employees are actively working the sales floor. Therefore, the employee can toggle his device to the sales mode, since the inventory and transaction functions are already covered.

Brief Summary Text (22):

The employee, while waiting for customers, can start folding and updating inventory by scanning bar codes on the goods. In this way, the employee actively contributes to a real time inventory database that will determine week to week, day to day, and even hour to hour which merchandise should be pushed by the employees.

Brief Summary Text (24):

When the customer tells him what she is looking for, he can check on his portable terminal if that item, and in the particular size, is in-stock on the sales floor or in the back of the store. If the employee finds out that the item is in a location that he cannot access, he can page another employee who access to that location to obtain the item for the customer.

Brief Summary Text (25):

The employee can thereafter complete a purchase by checking out the customer using the portable terminal. The sales associate can swipe the customer's credit card on the magnetic stripe reader on the portable unit. The portable unit can alert the sales associate that the customer has an unused store credit from a previous return, and the sales associate can ask the customer if she would like to use the credit now. The receipt will be printed at the nearest stationary terminal location where the sales associate can bag the merchandise and allow the customer to sign the receipt.

Brief Summary Text (29):

One of the advantages of the shopper system according to the present invention is the elimination of long lines at the cash wrap or point of sale.

Detailed Description Text (10):

While the portable terminal has been described as being used in the escorted

shopper system, it is understood that the terminal has many other uses. For example, the terminal can be used as a personal communicator or it can be used by customers in a retail system. Moreover, while the portable terminal has been shown to utilize an optical code reader such as a laser scanner, CCD imager, LED scanner or the like, the portable terminal can also have an RFID circuit for capturing information from RFID tags. The RFID circuit can be used instead of or in addition to the optical code reader. In fact, the portable terminal can use one or more different types of data acquisition devices for obtaining information to look up in one or more databases.

CLAIMS:

1. A sales system for use by a shopper escort comprising: a plurality of wearable portable terminals each having an optical code reader and a wireless transceiver and configured to have a transaction mode of operation allowing customer transaction to be performed from the terminal and an inventory mode of operation allowing updating of an inventory database; a plurality of stationary terminals each having a wireless transceiver; a central database having information relating to goods to be sold by the system; and a wireless network interconnecting the portable terminals, stationary terminals and the central database.

14. The system of claim 1, wherein the plurality of wearable portable terminals are each further configured to have a sales mode of operation providing at least one of policy and customer service information.

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